



SATURDAY, OCTOBER 2, 1875.

American Locomotive Practice.

The chief differences between American and British locomotives are those which are apparent at once to the outsider. Our own engines offer a great variety of feature, but they are all distinct from the American species, which resemble one another much more nearly than do the engines of any two of our principal lines. They all, or nearly all, have the truck or bogie supporting the smoke-box end of the locomotive; they all have the peculiar chimney; nearly all have the "cab." They have invariably two if not three domes, or attachments resembling "domes," always outside cylinders, and nearly always a large bell and a huge lamp—the latter carried just at the root of the chimney. The greater number of Transatlantic locomotives have four wheels coupled, though "freight" engines, as they are termed, have very often six wheels coupled. The diameter of the driving-wheels rarely exceeds 5 ft. 6 in. To our eyes the American locomotive is not a very symmetrical-looking machine, and, of course, compares unfavorably in external appearance with the best examples of our own really handsome iron horses. There cannot be a doubt, however, that the engines designed by American engineers are well calculated to do the work required of them under the existing conditions; and, though possibly it is treason to say so, there may be points in them which are worth the careful examination of our own locomotive builders. At all events, the bogie, almost an indispensable part of an American engine, is gaining ground in this country, and we have seen examples of new locomotives which are as much *fac-similes* of the American style as the *genius loci* would permit. There is the leading four-wheeled bogie, the outside cylinders and the four wheels coupled, which, to an engineer, are the principal external points of the typical engine of the States. True, the cow-catcher, the bell, the "funnel," and the lamp are missing, but possibly before long some of these will be added, especially as the details of the American engines become better known here, as they promise to do now that Mr. Forney, the New York engineer, has issued a "Catechism of the Locomotive." This book, which is, it appears, based on Kosak's "Katechismus der Einrichtung und des Betriebes der Locomotive," is at once a guide and textbook to the student and a *cademur* for the practical engineer. It is not, of course, so elaborate a work as the "Treatise on the Locomotive Engine," by Zerah Colburn, nor so exhaustive as Clark's "Railway Machinery," but it will, we think, take its place side by side with Bourne's "Catechism of the Steam Engine," and so be regarded as a standard text-book for students and others wishing to acquire a knowledge of the locomotive.

Mr. Forney introduces his subject with a few pages of explanation of the formulae and definitions of the terms used, and then commences the long list of 563 questions and answers which form the "Catechism." The first chapters treat of the steam engine, the forces of air and steam, "work," and heat, etc., for which Mr. Forney has drawn on Tyndall, Balfour Stewart and others; and then in Chapter VI. we have a general description of a locomotive engine, followed by a description of the various parts and explanations of the technical details connected with a locomotive and its work—such as indicator diagrams, motion curves, the mysteries of lap and lead, and so on, down to such practical matters as setting out the places of the tubes in both vertical and horizontal rows. The methods of calculating the various strains in a locomotive are given, and the reason why they are so calculated is clearly explained; and, when we mention that illustrations are supplied wherever necessary or desirable, we shall have indicated the character of the book and the completeness with which the subject is treated.

We may now notice some of the points in which American practice differs from British, taking them as we find them. In answer to the question as to the amount of steam space in the boiler, Mr. Forney says, the more the better, noting that the United States boilers generally have a wagon-top—4 ft. c., the portion of the shell over the fire-box is elevated to sometimes as much as 18 in. over the cylindrical part or barrel. In addition to the wagon-top, the American locomotive has a steam dome, which is usually placed over the fire-box. The dome is apparently considered as much an essential of the locomotive in America as the boiler itself, although, as many of our recent examples show, it is not looked upon with much favor in this country, where the boiler also is as often made with flush top as with wagon top over the fire-box, which, however, is rarely elevated more than a few inches above the barrel. There are some recent specimens in America in which the boiler top is flush, but the dome is never, we believe, dispensed with.

The "truck" or bogie, curves, and coning of wheels are very fully treated by Mr. Forney; but respecting the latter he says that the advantage is more apparent in theory than in practice, for, even if the action of the "coning" is beneficial, the advantage is soon lost owing to the wear of the tires. On some American lines the curves are so short that it is necessary to so arrange the center pin or pivot of the truck that it can move laterally in order to avoid flange friction and danger of jumping the rail. The ordinary type of locomotive cannot run backwards without losing all the advantages of the bogie, the flange friction on the back driving-wheels being excessive. For this reason shunting and construction engines often have a two-wheeled truck at both leading and trailing end, as have also goods engines which have more than four wheels coupled. Speaking of Mr. Fairlie's plan of connecting the running gear to the frame and boiler by means of trucks and center-pins, we are surprised to find that Mr. Forney can say that the plan has been "very much improved" by Mr. William Mason, of Taunton, Mass., especially as he does not point out in what the superiority of the American-made Fairlie consists. Mr. Forney gives several plates of locomotives. A four-wheeled switching engine by the Hinkley Works has three "domes" on a flushed-top boiler, two of the "domes" being in this case sand-boxes, which help to give a clumsy look to the engine. The driving-wheels are 50 in. in diameter, with cylinders 15 in. by 24 in.; the weight of the engine being 48,000 lbs. The tubes are 10 1/2 in. in length, and the wheel base 6 ft. 9 in. The length of the frames, or of the boiler and fire-box is not given. An eight-wheeled "American" locomotive, by the Baldwin Works—the typical engine of the country—has a four-wheeled truck and four wheels coupled, the latter being 60 1/2 in. in diameter and 8 ft. from center to center. The cylinders are 16 in. by 24 in., and the total heating surface 926 square feet. There are 144 2-inch tubes, 10 ft. 11 in. long, and the outside diameter of the smallest ring of the flush-topped boiler is 4 ft. Three "domes" ornament the top, one of which is the usual sand-box, the steam-dome proper being over the fire-box. The total weight in working order is 65,000 lbs., 42,000 lbs. of which is on the driving-wheels. A ten-wheeled locomotive by the Baldwin Works has a four-wheel truck and six wheels coupled, 4 ft. 6 in. diameter. The cylinders are 18 in. by 24 in., and the total heating surface 1,108 square feet, the tubes being 12 ft. 9 in.

long. A "Mogul" locomotive, by the same makers, has six wheels coupled and a two-wheeled truck at leading end. The driving-wheels are 4 ft. 4 in. in diameter, the cylinders 18 in. by 24 in., and the total heating surface 1,067 square feet. The boiler has a level top, the smallest diameter being 4 ft. 2 in. outside. The total weight in working order is 77,000 lbs., with 66,000 lbs. on driving-wheels. The "Consolidation" locomotive, constructed by the Danforth Company, has eight wheels coupled and a two-wheeled or Bissell truck at leading end. It weighs 96,550 lbs. in working order, 86,430 lbs. being on the drivers, which are 4 ft. 2 in. in diameter. The cylinders are 20 in. by 24 in.; the heating surface 1,509 square feet; length of tubes, 13 ft. 9 1/2 in.; the boiler has wagon-top over the fire-box, and its smallest diameter is 4 ft. 2 in. These locomotives are employed almost exclusively for working over heavy mountain grades. Several other forms of locomotive designed for special purposes are illustrated, but we have not space to refer to them in detail, and we do not think that designers of locomotives in this country have much to learn from them. Mr. Forney's book, however, is the only one, we believe, in the English language which gives so much practical information in connection with the locomotive within reasonable limits. Every detail, so far as we have been able to discern, is clearly explained in a practical manner, and there are several chapters on—among other things—the care of the engine, on running locomotives, on accidents to them and to those in charge of them, on continuous brakes, and various other matters which drivers have continually under their notice. The book is well adapted to the student, and is also calculated to give the locomotive-driver a technical acquaintance with a machine with which he is practically familiar. We could have wished that Mr. Forney had introduced some recent examples from this country, and compared the respective merits of the two practices; but perhaps he has done well to confine his attention to those with which he is doubtless best acquainted.—*The English Mechanic.*

Phosphor-Bronze Axle Bearings.

Dr. Charles Kunsel writes as follows in the *Practical Magazine*:

When two bodies are rubbed against each other, under equal pressure and at equal velocity, the harder they are the greater is the amount of heat; or, on the other hand, the greater the difference of hardness between the two bodies rubbed against each other the less is the heat produced. In the latter case the harder body is more heated than the softer, if of equal size. If, for instance, glass is rubbed against cork, the heating is as seven to one (the glass being heated seven times hotter than the cork); if copper is rubbed against cork, as four to one.

The ideal of a bearing which would wear little would be one made of the same material as the axle revolving in it, if there had not to be taken into consideration the wearing of the axle itself and the heating. A bearing made of the softest material in which an axle of the hardest material revolves would be the ideal of a bearing which does not heat and does not cut the axle, if the wear of the bearing and the deformation by pressure, etc., had not been taken into consideration.

1. In practice the best medium must be found which does not cut the axle.
2. Wears (in itself) as little as possible, and consequently requires a minimum of lubrication.
3. Does not heat, even in case of lubrication being neglected.
4. Is capable of resisting any possible shock without changing its form or breaking.

Some railway companies desire to use few bearings, at the expense of many axles and much lubricant (the consumption of lubricant is always in proportion to the wear of the axle on the bearing), and therefore use bearings containing from 17 to 20 per cent. of tin and 83 to 90 per cent. of copper, which alloy undoubtedly is too hard, and must attack the axle, as has been shown on many railways. Other railway companies use alloys of lead, with more or less antimony, which certainly do not attack the axles, but require much lubricant, and wear out very fast. A great number of railway companies in Germany take refuge in the so-called white metal, which, if of proper composition, appears cheap, but in the long-run certainly is the most expensive. With the alloy of copper and antimony it is impossible to secure a hardness approaching that of the revolving axle without rendering them brittle. If an alloy is used sufficiently hard to avoid great wear these bearings will heat much and are very brittle.

On most of the English, Belgian, German, French, and particularly on American railroads, white metal, and especially lead composition, bearings are little used, and this with good reason; for what would become, for instance, of a white metal bearing on an American railroad where the bearings are subjected not only to heavy loads, but where they have to travel thousands of miles on rails belonging to other companies, and where there are not much looked after.

Gun-metal bearings, alloys of tin and copper, are not homogeneous, with the exception of the alloy of 17 to 18 per cent. of copper, which is the most trustworthy alloy of tin and copper. In alloys containing a lower percentage of tin, the latter segregates in the form of tin spots when the alloy cools slowly. All other compositions in use for bearings, such as 12 to 17 per cent. and 88 to 93 per cent. of copper, do not make homogeneous bearings, unless they are cast in tin molds, which in practice is impossible. This heterogeneity of gun-metal bearings is dangerous, as it produces gripping, and thereby a rapid wear. This specific quality of gun-metal bearings (to grip) is theoretically easily explained. In cooling, the softer metal (composed of from 7 to 10 per cent. of tin and 93 to 90 per cent. of copper) being the less fusible, sets first, forming the skeleton of the bearing; later, the very hard and brittle alloy, containing 17 to 18 per cent. of tin and 83 to 82 per cent. of copper, sets, and fills the pores of the softer skeleton. The particles of the harder alloy are easily torn away by the axle if the bearing is not sufficiently lubricated, and these tear the skeleton composed of the softer alloy; these I have frequently observed at rolling mills where the bearings were not sufficiently lubricated, and where the particles, in the form of small flakes, fall off.

A good bearing, which answers all purposes, must not be homogeneous, but must consist of a strong and tough skeleton, the hardness of which nearly equals that of the axle, in order to resist shocks without deformation, and the pores of this skeleton must be filled with the soft metal or alloy.

The nearer the hardness of the skeleton approaches the hardness of the axle, the better the bearing will resist the pressure or shocks; and the softer the metal filling the pores the better the bearings in every respect. Such bearings are now made by melting two or more alloys of different hardness and fusibility together, in such proportions that necessarily a separation into two alloys of definite composition takes place in cooling.

Phosphor-bronze bearings consist of a uniform skeleton of very tough phosphor-bronze, the hardness of which may easily be regulated to equal the hardness of the axle, while the pores are filled with a soft alloy of lead and tin.

Such a phosphor-bronze bearing may, therefore, be considered as having its wearing surface composed of a great number of small bearings of very soft metal encased in the tough and strong metal which equals the hardness of the axle on the planed bearing surface. This molecular disposition cannot be detected by the naked eye, but if examined with a magnifying glass the truth of the above will at once be seen. Another

practical proof can be given by exposing such bearings to a dull red heat, when the soft alloy will sweat out and the hard spongy skeleton-like mass remains.

Shipments of Goods to the Centennial Exposition.

The following circular to exhibitors has been issued by Mr. D. Torrey, Chief of the Bureau of Transportation:

1. *Reception of Articles.*—The general reception of articles at the Exhibition buildings will commence Jan. 5, 1876, and close on April 19, 1876. Machinery and other heavy articles will be admitted as soon as the special foundations for them are prepared, and it is desirable that they should be in place prior to the reception of other exhibits.

2. *Boxing.*—In boxing goods for the Exhibition, screws should be used instead of nails.

3. *Shipping Directions.*—Each package must be marked, "To the Director General, International Exhibition of 1876, at Philadelphia," and should be marked on two adjoining sides, giving the following information: Name of the exhibitor; siding at which to be unloaded; specific location allotted to the exhibitor; weight of the package; total number of packages sent by the exhibitor; serial number of the particular package. Within each package should be a list of articles and a copy of the outside directions.

Unless this information is on the package, it will be withheld from delivery, at the expense of the exhibitor, until obtained.

NOTE.—*Sidings and Platforms.*—To facilitate the delivery of packages so marked, there have been constructed within the Exhibition grounds several lines of railway, as shown on the accompanying map. At convenient points on these lines are located sidings and platforms for the delivery of articles to be exhibited in the immediate vicinity. Each siding is designated by a number, and the address label or tag on each article or package must give the number of the siding at which it is to be delivered. The address label should also state the location in the building in which the article is to be exhibited, in accordance with the system for designating localities, as follows:

Location.—"Each column within the building will be lettered and numbered; the letters designating the lines of columns lengthwise, from east to west, and the numbers the lines crosswise, from north to south. Each exhibitor will have his location defined with reference to the nearest column, and the official directory of the building will give the positions according to this system."

4. *Arrangement with Transportation Companies.*—The exceptional arrangements made by the United States Centennial Commission with transportation companies do not in any way affect the regular rules of such companies in regard to the classification of goods, or the conditions of receiving or transporting the same, except in requiring the prepayment of freight and other charges. The rates for transporting goods for the Exhibition will be obtained from the agents of the transportation companies at the place of shipment and not at Philadelphia.

5. *Through Bills of Lading, and Advice of Shipments Made.*—Through bills of lading should be obtained, so that goods will, without any attention by the shipper, be sent direct to the Exhibition, and letters of advice should be addressed at the time of shipment to the Chief of the Bureau of Transportation, giving information of the shipments made and full particulars in regard to articles of bulky dimensions or excessive weight. Packages should contain only articles intended for a single department.

6. *Terminal Services.*—The transportation, receiving, unpacking, arranging, re-packing and re-shipping of the goods exhibited, also the storage and repair of empty cases, will be at the expense of the exhibitor. Foreign commissions, or such agents as they may designate, will be responsible for the receiving, unpacking and arrangement of exhibits from their respective countries, as well as for their removal at the close of the Exhibition; and no person will be permitted to act as such agent until he can give to the Director-General written evidence of the approval of his appointment by the proper Commission.

7. *Terminal Charge.*—To secure order and dispatch in the reception and installation of goods in the Exhibition, all packages on arrival at the Exhibition inclosure will be received by the Chief of the Bureau of Transportation. They will then be unloaded and placed on the space allotted to the exhibitor—the empty cases will be stored, and at the close of the Exhibition they will be returned, and when repacked will be removed from the buildings. For this service, which the United States Centennial Commission will undertake as agent for exhibitors, and especially for their accommodation, a terminal charge will be made.

NOTE.—*Provision for Performing Terminal Service.*—The regulation providing a terminal charge to meet certain specific expenses for which exhibitors will be liable will establish system and organization in the reception and delivery of goods at the Exhibition. The expenses of this terminal work include the construction of railroad tracks, freight platforms, storing-sheds, repair-shops, cranes, derricks, trucks, telegraph lines, etc., etc., and the service of a large organized force which, to secure efficiency and prevent confusion, will be under the direction of the Commission.

8. *Pre-payment of Freight and Charges.*—All charges for freights, transfers, etc., and terminal expenses must be prepaid at the time of shipment, or be assumed by the transportation company delivering the goods. The United States Centennial Commission will not be responsible for any such charges, nor will exhibits be received unless this regulation is complied with.

9. *Rates and Terminal Charges.*—The terminal charges will be as follows:

On articles or packages weighing 250 lbs., or less.....	\$1 00 each.
On articles or packages weighing from 250 lbs. to 5,000 lbs.....	40 cts. per 100 lbs.
On articles or packages weighing over 5,000 lbs.....	50 cts. per 100 lbs.

Articles weighing over 10,000 lbs., fragile articles, plate glass, etc., and works of art, may be subject to an additional charge after arrival at the Exhibition, to cover the extra cost of handling.

10. *Customs Regulations.*—The customs regulations, issued by the Secretary of the Treasury of the United States, permit the immediate transportation to Philadelphia of goods imported from foreign countries. They will be transported by bonded line from the port of arrival to Philadelphia, and delivered to the Collector at that city. The customs regulations for these goods must be strictly complied with.

11. *Neglected Packages.*—If no authorized person is at hand to open and arrange the goods in the Exhibition building, they will be removed and stored at the cost and risk of whomsoever it may concern.

12. *Removal of Goods.*—The Exhibition will close the 10th of November, 1876. The removal of goods will not be permitted prior to that date, and must be completed before the 31st of December, 1876. Goods then remaining will be removed by the Director-General and sold for expenses, or otherwise disposed of under the direction of the United States Centennial Commission.

The Centennial Commission reserves the right to explain or amend these regulations, whenever it may be deemed necessary for the interests of the Exhibition.

A. T. GOSHOPE, Director-General.
D. TORREY, Chief of Bureau of Transportation.
PHILADELPHIA, Sept. 11, 1875.

* *Catechism of the Locomotive.* By M. N. FORNEY, M. E. New York: Railroad Gazette Office.

Ridley Park Station, on the Philadelphia, Wilmington and Baltimore Railroad

This beautiful and attractive station was built in 1872 on this company's improved line of road between Philadelphia and Chester, ten miles from the former city. It is located on the highest ground in the Park, and directly over the railroad tracks, being supported by an iron truss bridge and heavy walls of masonry.

It is built of wood, size 75 x 26 1/2 ft. It comprises a ladies' and gentlemen's room, telegraph and ticket offices, baggage rooms, and ladies' dressing room. Trunk elevators in the walls on either side are conveniently arranged to raise the baggage to the rooms above, while broad covered stairways are provided for the passengers.

All the outside walls, as well as the roof, are covered with slate, arranged in colors and fancy patterns. The roof and walls inside are furnished with ash sheathing, no plastering being used in the building. Piazzas are built on both ends of the station, and on both sides there are wide walks protected by highly ornamental iron railings.

The north side of the station being on the line of Ridley avenue, a bridge similar to the one supporting the station has been built for highway purposes. The cost of the station was \$14,700; of the masonry, \$18,000; bridges, \$7,000. The architect was T. P. Chandler, Jr. The structure was built under the direction of S. T. Fuller, Chief Engineer of the railroad.

foreclosure in view of the large amount of debt ahead of the bonds, and suggests an assessment of 20 per cent. on first-mortgage bondholders, or the raising of \$300,000 upon the faith of the road to discharge the preferred debt.

Delaware Shore.

Work has been suspended for some time, owing to the failure of the contractor. The grading is now, however, being finished, and a contract for the tracklaying has been let, the work to be done by Dec. 1.

New York & Oswego Midland.

The argument as to the release of certain of the branch lines from the leases to the Midland came up again before the United States Circuit Court Sept. 21. The time for taking testimony was extended to Sept. 27, and the final argument set down for Oct. 2.

Emmittsburg Branch.

The work of grading this branch of the Western Maryland has been completed, and the rails are now being laid. It is expected that the road will be finished early in November.

Connecticut Railroad Commission.

The Hartford *Courant* says: "The Railroad Commissioners have undertaken an important work in having the large railroad bridges of the State thoroughly examined. Mr. A. D. Briggs, of Springfield, a bridge builder and thorough expert, has already examined the bridge of the Hartford & Providence road across the Connecticut, and will make his report in writing. It is understood that it was found to be in remarkably good condition. Monday, Mr. George W. Fuller, of Norwich, the well-known submarine diver, began an inspection of the foundation of the Shore Line Bridge at Lyme, and of the river bed, and will report the exact condition of the structure. The railroad companies, though keeping a very close inspection

low price for the bonds of a company whose credit is as good as the Eastern's always has been.

On behalf of the present management it is charged that the movement against the company is mainly the result of the efforts of certain parties to secure a controlling interest in the Maine Central. Of the latter company's 36,000 shares, 5,000 are owned by the Eastern Company, and 17,000 more by persons directly connected with it, who also have large holdings of its stock. It was, it is claimed, intended to force these parties to save themselves by selling their Maine Central stock, and to this end the extraordinary depreciation of Eastern stock has been brought about.

The committee appointed by the board of directors to prepare a statement is actively at work, and the document will soon be ready for publication. It is said that it will recommend a policy of strict economy, a reduction of salaries and officers wherever possible, and other changes in the management.

Rochester & State Line.

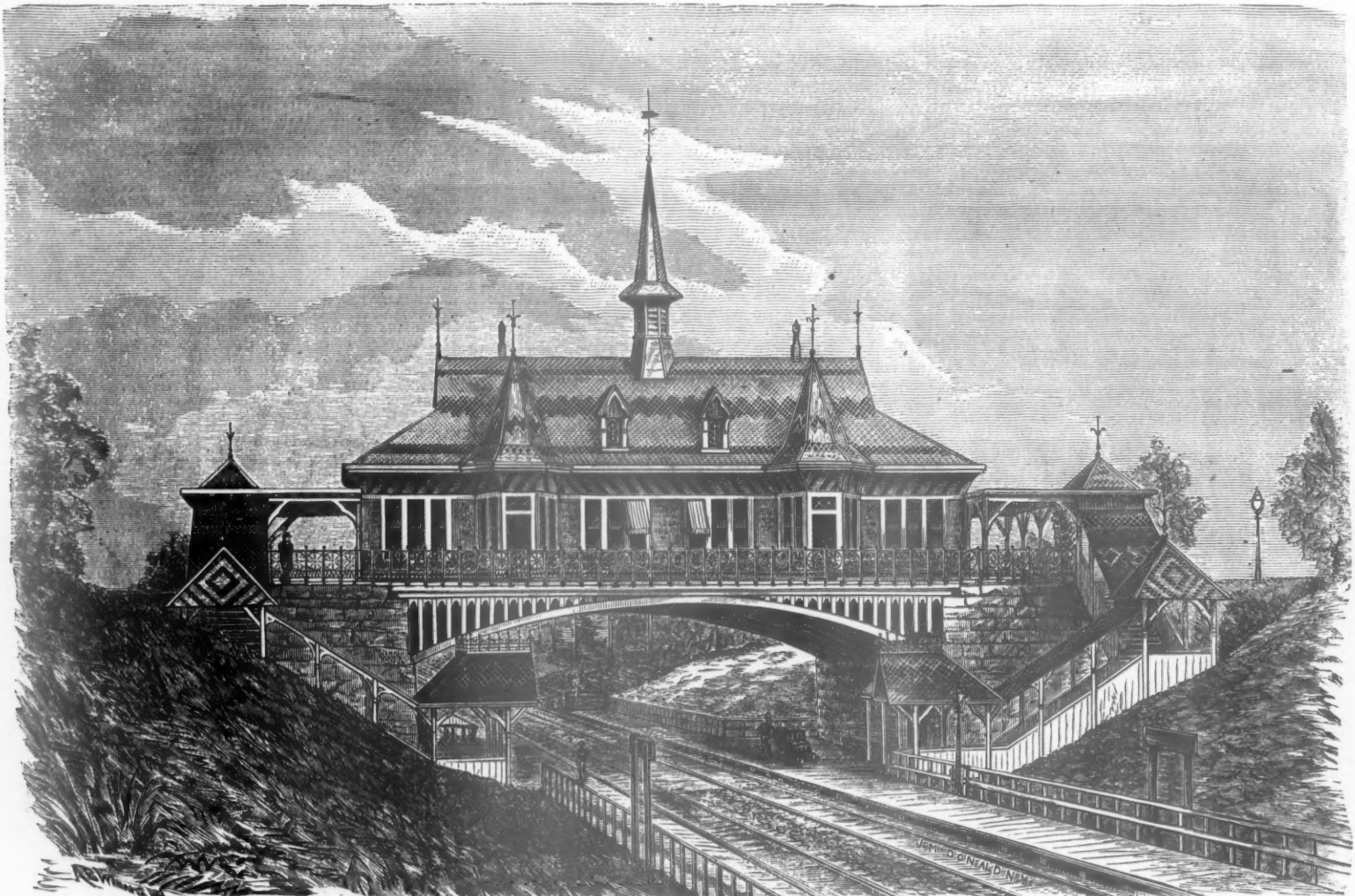
It is now stated that three-fourths of the creditors have accepted the terms offered and signed the agreement, and a number of others have signified their willingness to do so. A considerable amount has also been subscribed toward the completion of the road, and it is hoped that work may soon be resumed.

Erie.

The force in the car shops at Elmira has been increased, and orders have been given for 50 new passenger cars to be built at once.

New Jersey Midland.

The South Mountain & Boston Railroad Company has made a proposition for the purchase of this road, which is submitted



RIDLEY PARK STATION—From the Track. Philadelphia, Wilmington & Baltimore Railroad.

OLD AND NEW ROADS.

Southwest Pennsylvania.

It is said that arrangements have been made for the money needed to complete the extension from Connellsville to Uniontown, and that parties in the latter place have agreed to furnish it and to take five-year 7 per cent. bonds. Work will be resumed at once and pushed forward so as to complete the road before winter.

Farmers' Union.

Mr. F. A. Soule, General Superintendent, informs us that the company has now 12 miles ready for the iron and about 20 graded. There are now two miles of track laid and the iron for twelve more is bought. It is intended to have the line in operation from Liscomb, Ia., east to Beaman, 12 miles, in October.

Logansport, Crawfordville & Southwestern.

The committee of first-mortgage bondholders has made a report in which they say that the amount nominally expended in the construction of the road is \$4,279,910.25. The contractors who had assumed the construction of the road failed before its completion, leaving the enterprise in an unfinished condition. The present liabilities of the road are \$4,097,000, of which \$322,000 are receivers' certificates taking precedence of bonds.

The earnings for 1874 showed a deficit of \$79,800.87, the expenses exceeding the gross earnings by that amount. For the first six months of 1875 the earnings were as follows:

Gross earnings (\$1,061 per mile).....	\$125,423 10
Working expenses (134.99 per cent.).....	169,306 60
Deficit	\$43,883 50

The rolling stock of the road is valued at \$155,750, on which there is still due \$79,536.68. The committee advises against

upon their bridges, are very glad that the Commissioners have taken the course they are pursuing, as the result will remove all doubt, if any exists, and will certainly be very satisfactory to the traveling public."

Pennsylvania.

The Altoona *Sun* of Sept. 25 says: "On Monday 100 men in the erecting shops were let off for a week, the understanding being that for some time to come the workmen would be changed off, week about. On Thursday morning, however, all hands were required to be in their places again, and it is expected that they will remain on duty for quite a length of time. Orders for twelve more 'modocs' have been received, a number of stock and gondola cars are to be rebuilt, and several other encouraging features are spoken of."

These "modoc" pattern engines are probably the heaviest now in use in this country; two or three of them have been in use on the Philadelphia Division for several months, and are said to be working very well and economically. They have 20 by 24 in. cylinders, four pairs of 48 in. driving-wheels, and weigh 45 1/2 tons.

Gilman, Clinton & Springfield.

The Court has ordered the Special Master in the case to pay over to Mr. Seyton, agent for the trustees, the sum of \$41,184, which Receiver Hinkley paid over to the Court on account. The Master and his assistants are still at work examining the books.

Eastern.

There is just now a persistent effort being made in Boston to force down the prices of the stock and securities of this company. A statement recently published charges that the floating debt is \$2,200,000 and the total debt \$15,000,000, and that it has increased much faster than the revenue of the company. The effort has succeeded so far that the stock sold in Boston this week for 21 1/2, and 7 per cent. bonds of 1882 at 70 1/2, a very

to bondholders for their approval. It amounts in substance to the transfer of the property to the South Mountain & Boston Company, that corporation issuing its own stock, bonds, etc., in exchange for those of the Midland. The issue of first-mortgage bonds will be \$3,000,000, of which \$1,000,000 will be known as Series A and \$2,000,000 as Series B. The company will reserve the right to pay the coupons on Series B in scrip for six years. Each holder of the present first-mortgage bonds will receive one-third of their face in bonds of Series A and two-thirds in those of Series B. Holders of second-mortgage and consolidated bonds will exchange their bonds for those of the purchasing company having the same priority and lien on the property.

The South Mountain & Boston Company is engaged in building a road from the Delaware River, at Portland, northeast to the New Jersey Midland, between Hamburg and Deckertown. It is to be an extension of the South Mountain Railroad of Pennsylvania and part of a projected line from Harrisburg to the Hudson River. As security for performance of contract, it offers to deposit \$600,000 first-mortgage bonds of the South Mountain Railroad of Pennsylvania.

The South Mountain & Boston road, if completed, will doubtless be a connection of some value to the Midland. It is not apparent, however, that the proposed transfer to a concern in which some of the original builders of the Midland are interested, and which has no road of its own completed, is going to benefit the bondholders in any way. What is needed is an immediate foreclosure, a reorganization with a small and compact capital account and thereafter capable and honest management, which will seek to build up the local business and will let outside schemes and entangling alliances alone. Receiver Hobart, in the short time which he has had the management of the road, has given a specimen of what can be done by honest management; but a receiver's office is only temporary and the sooner the bondholders take the possession and management of their property into their own hands

the better for themselves and the road. The line can never, from its location and connections, be a rich one, but there is no reason why it cannot be made a fairly prosperous and profitable property.

Woodstock.

The tracklaying is completed, and the road is now open for traffic with trains running regularly. The new line is 14 miles long and extends from the Vermont Central at White River Junction, Vt., west by south to Woodstock. It has been under construction for several years.

Northern Central.

This company has further extended its terminal facilities in Baltimore by the lease of Brown's and Jenkin's wharves with the warehouses upon them. Side-tracks will be laid upon the wharves at once, and Brown's wharf will, as now, be used entirely for the handling of coffee, the other being used for general freight.

It is understood that the contract for the new elevator at Canton will be given out at the next meeting of the board.

New Haven & Northampton.

On application of the company the Court of Common Pleas has granted a temporary injunction prohibiting the Plantsville people from going on with the erection of their depot. The latter have carried the case to the Superior Court and there moved to dissolve the injunction granted by the lower court.

Illinois & St. Louis Bridge.

The New York *Bulletin* says: "The Circuit Court at St. Louis has issued an order relative to the payment of interest on the first mortgage bonds of the St. Louis Bridge Company. According to its stipulations, the receivers are to provide for the payment of the interest due Oct. 1 by borrowing such money

on these bonds as are to be made by Oct. 1. A motion to admit the bondholders not represented in the committee at the time of the sale to a share in the property like the other bondholders was voted down.

Mr. Osterberg was highly praised for his conduct of affairs, and the meeting seems to have done everything that he desired. Dr. Fester, the chairman, summarized the situation by saying, "that in order to be able to sell the road, they must not be obliged to sell it."

Cairo & Vincennes.

It is said that the general offices are to be moved from Cairo, Ill., to Vincennes, Ind., shortly.

The receivers have a quarrel on hand with the city of Cairo, certain side tracks in that city having been indicted as a nuisance, and steps taken to have them removed.

Chicago & Northwestern.

The last annual report is issued in the Dutch language at Amsterdam, bearing the title: "Jaarverslag van de Chicago en Northwestern Spoorweg-Maatschappij." The preferred stock as well as the bonds is largely held in Holland.

New Mail Routes.

Mail service has been ordered over the extension of the Little Rock & Fort Smith road from Clarksville, Ark., to Altus, 20 miles, to begin Oct. 1.

Chicago, Danville & Vincennes.

Mr. F. W. Huidekoper, Chairman of the bondholders' committee, has issued the following circular:

"By the terms of the agreement made between you and the company at the time of funding your coupons, the failure on their part to pay the coupon of your first mortgage bonds due

the State line in West Kansas City, where the Missouri Pacific owns some property. It is said that the Atchison, Topeka & Santa Fe and the Kansas Pacific would prefer not to run their trains across the Missouri line, if a depot can be located there.

Mississippi River & South Missouri.

This newly-organized company purposes building a railroad from Ste. Genevieve, Mo., on the Mississippi River, west by south to Salem in Dent County, about 95 miles, with a branch to the Iron Mountain road in St. Francois County. The capital stock will be \$1,500,000.

Meetings.

The following companies will hold their annual meetings at the times and places given:

Toledo, Wabash & Western, at the office in Toledo, O., Oct. 6, at 10 a. m.

Ohio & Mississippi, at the office, No. 217 West Fourth street, Cincinnati, Oct. 14, at 10 a. m. Bondholders as well as stockholders vote.

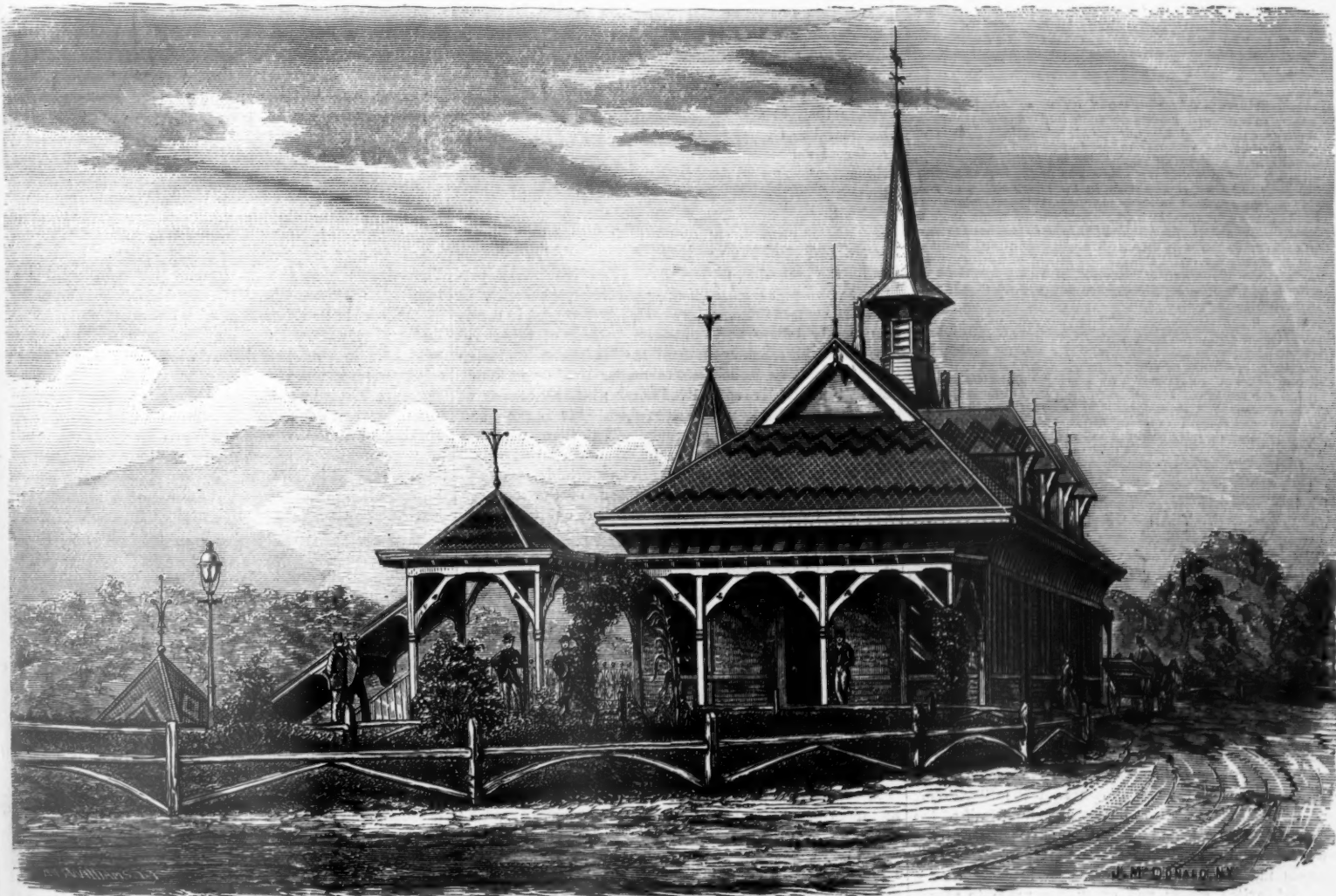
Vermont & Canada, in Bellows Falls, Vt., Oct. 21, at 12 noon.

Old Colony.

This company has joined in the general movement of the New England roads and has ordered a reduction of 10 per cent. in all salaries and wages, to take effect Oct. 1.

Railroad Business in Peru.

The Lima advices of the 28th of June to the Buenos Ayres *Standard* state that Peru is completely out-at-elbows with the lavish expenditure of one hundred millions of hard dollars on the new railways, which are described as the wonder of the age, but terminate so high up the Andes as to promise low dividends. The Budget, which it is stated is made up every two years, gives the expenditure for 1876-7 at \$74,250,000, while the



RIDLEY PARK STATION.—From the Carriage Road Approaching It. Philadelphia, Wilmington & Baltimore Railroad.

is necessary over the amount already in their possession applicable to this demand, at any rate of interest not exceeding 7 per cent. per annum. For the money thus borrowed, the receivers are authorized to pledge the net receipts that come into their hands after the payment of the necessary expenses attendant on the operating and preserving the bridge and the payment of taxes, and any notes that may come due for which real estate of the company has been pledged as security."

Rockford, Rock Island & St. Louis.

At the meeting of the bondholders for whose account the road was sold at foreclosure sale in Chicago, held in Frankfort-on-Maine on the 10th of September, Mr. Osterberg, their agent, submitted his report, showing his purchase of the road for \$1,320,000, and the advisability of raising the money to pay the purchase money and to put the road in good order before attempting to sell or rent it. The meeting, after considerable discussion, resolved: 1. That the holders of both classes of bonds represented in the purchase should share alike in contributing to and in receipts from the property, notwithstanding the decision of the Court, according to which holders not joining in the purchase will receive about \$110 currency per bond for Nos. 1 to 5,000 and only \$60 from Nos. 5,001 to 8,000. 2. That the resolution of last year requiring the ratification of the bondholders to any plan for organization of a new company, or a sale or lease of the road, be modified so as to give the committee unlimited power to rent the road to some company safe beyond doubt and acknowledged to be sound, either already in existence or to be created hereafter, or to sell it, or undertake the management of it directly. For this purpose there were added to the committee G. F. Schumacher and Director Baist, of Frankfort, and M. Hausmeister, of Stuttgart. 3. To raise the sum of \$1,000,000 in United States currency by an issue of \$1,000,000 of 7 per cent. bonds, payable in ten years, principal and interest payable at Frankfort-on-Maine, in gold, and secured by a first mortgage on the road and equipment. These bonds to be allotted to the bondholders represented in the committee at the rate of 20 per cent. of their old holdings, at 90 gold. Payments

Oct. 1, 1875, gives you the right to again demand from Wm. R. Foodick, Trustee, your four coupons held by him.

"The Committee urge you, on the 1st prox., or immediately thereafter, to present your certificates of indebtedness, or convertible mortgage bonds received in funding, and insist on return of said coupons.

"The certificates or bonds may be sent to T. W. Shannon, Treasurer, care of National Trust Co., 261 Broadway, New York City, if you desire the Committee to attend to the matter for you.

"The following persons are, by the report to the United States Court of Gen. Anderson, Receiver, the holders of the fraudulently-issued chattel mortgage bonds, by which the company attempted to deprive you of the equipment of the road formerly mortgaged to your trustees as part of the security for your bonds. (See Investigating Committee's Report of April 14, 1875, pages 22 and 23).

E. C. Bogart, New York.....	\$25,000
A. T. Chur, one of the Funding Committee—with W. Bailey, Lang & Co., New York, formerly agents for the sale of the bonds (for reference to whom see Investigating Committee's Report, page 6).....	31,000
Marine National Bank of New York, J. D. Fish (one of your trustees), President.....	100,000
Wm. B. Stevens, Boston, President Globe Bank.....	120,000
N. S. Bouton, President Chicago & Southern Railroad, one of the leased lines.....	36,000
Judson & Tenney, New York, President and Treasurer C. D. & V. R. R.....	624,000
Total.....	\$936,000

"Held by Receiver..... 64,000
"Total..... \$1,000,000

Kansas City Union Depot.

The Union Depot in Kansas City, Mo., caught fire early on the morning of Sept. 22, and was entirely destroyed, except a part of the platform. The loss was about \$30,000. It is thought that the depot will not be rebuilt on the old site, but that a new one will be put up near

ways and means do not exceed 65½ millions, leaving a deficit of nine. To meet this, one committee of Congress has proposed that a reduction of 25 per cent. be made in the salaries of all employees, while another advocates that only the most urgent demands be met, and that all expenditure which is not absolutely necessary be postponed until the financial condition of the country improves.

Dividends.

Dividends have been declared by the following companies: Chicago, Rock Island & Pacific, 4 per cent., semi-annual, payable Oct. 27.

United New Jersey, 2½ per cent., quarterly, payable Oct. 9. Housatonic, 2 per cent., semi-annual, on the preferred stock, payable Oct. 11.

Central of New Jersey, 2½ per cent., quarterly, payable Oct. 20. Delaware, Lackawanna & Western, 2½ per cent., quarterly, payable Oct. 20.

Philadelphia & Trenton, 2½ per cent., quarterly, payable Oct. 9.

Cincinnati Southern.

The trustees advertise for proposals for 100,000 ties, to be delivered on the line of the road in Scott and Morgan counties, Tennessee. Bids will be received for 5,000 and upwards, and must be sent to the Trustees' office, No. 70 West Third street, Cincinnati, by Oct. 11. Specifications can be seen or obtained from the same office.

Connecticut Central.

Tracklaying on the main line is progressing steadily, and the rails are now down from East Hartford north about four miles. The grading is almost entirely completed on the main line, and is well advanced on the Rockville Branch.

Peoria, Pekin & Jacksonville.

Arrangements are being made to remove the headquarters and general offices of this company from Pekin, Ill., to Peoria. The change will be made about Nov. 1.



Published Every Saturday.

CONDUCTED BY

S. WRIGHT DUNNING AND M. W. FORNEY.

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Editorial Announcements.

Addresses.—Business letters should be addressed and drafts made payable to THE RAILROAD GAZETTE. Communications for the attention of the Editors should be addressed EDITOR RAILROAD GAZETTE.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns our own opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

FIFTY YEARS OF RAILROADS.

Fifty years ago last Monday, the first steam railroad in the world was opened. Then for the first time it was proved that a steam engine could draw a heavy load over a smooth track at a speed of ten or twelve miles an hour, at the town of Darlington, in the North of England, where the Stockton & Darlington Railroad was then opened amid public rejoicings. Last Monday this event, really one of great eras in the history of civilization, was to be commemorated at Darlington under the auspices of the Northeastern Railway Company, which now owns the Stockton & Darlington road. At that time a statue of Joseph Pease, perhaps the most effective promoter of this earliest of railroads, the first Treasurer of the Stockton & Darlington Company, was to be unveiled, a portrait of the same gentleman presented to the Council Chamber of the town, an exhibition of locomotives and other railroad appliances made, a grand banquet given to more than a thousand invited guests, and excursions made to places whose industries have been largely created by this pioneer of England's and the world's railroad system.

Doubtless on that occasion there were present some who witnessed the momentous trial fifty years before. Men who had fairly begun their life's work then still live around us, and have not all retired from active business, so that the entire railroad system of the world as it exists to-day has had its growth from its birth up not only within a single life-time, but within the adult period of a single life-time. Men since the time of arriving at full maturity have witnessed its entire development and been able to bear fresh in memory every step in its progress.

What that progress has been, counted in miles of track, is not hard to say: there are now something more than 180,000 miles of railroad in the world. But what it has been, counted in the growth of traffic, the development of industries, the opening to settlement of districts hitherto counted inaccessible, the increase and cheapening of those commodities which, at our present grade of civilization, men most desire, cannot be accurately measured, can be estimated only after a profound study of the resources of the world now and before the railroad era, though it evidently is enormous. The life of nearly all civilized and of many uncivilized men throughout the world has been greatly modified by the improved means of transportation. The distribution of population, the manners and customs of peoples, their education and their very prejudices have been greatly modified by it, and to such an extent that any forecast of the probable progress of the world made before

1825 must have been radically erroneous for lack of consideration of this great but then unknown factor in the problem.

Probably there is no part of the world where railroads have had a greater effect than in our own country. True its growth in population had always been rapid, and its extensive seaboard and enormous river systems made larger areas than on most other continents accessible and available for production for foreign consumption—which was the necessary condition of its early and rapid occupation and cultivation. But its rapid rate of growth certainly could not have continued so long but for the railroads which have now penetrated nearly every part of its territory which is desirable for settlement. Imagine all our railroads removed to-day. The condition would, of course, be much worse than if there never had been any, in which case other modes of transportation would have been provided on many routes; but with the best of these other modes, it is easy to see that there are vast districts, now thickly peopled and wealthy, which would have remained almost in the state of the primeval wilderness, while the rest of the country could not have been so fully occupied as it now is.

Doubtless so far the chief effect of railroads has been to increase the material wealth of mankind. Saving, as they do, a great amount of that time which is so requisite for the development of mind and heart as well as for the production of food, clothing and shelter, the great mass of mankind has preferred to devote this time to the acquirement of more or better nourishment and garments rather than to the cultivation of the arts and sciences and morals. Generally they have not preferred to live easier lives, and this and other labor-saving inventions have apparently not produced any tendency toward South Sea indolence—the disposition to be satisfied with what one's fathers had, and to make no exertion beyond that necessary to secure this; indeed, civilization is so largely the product of progressive desires and the efforts to satisfy them that this perhaps was not to be expected. At least, generally, in modern communities, when a man has succeeded in securing twenty dollars' worth of the good things of this world for his week's consumption and has his income increased to thirty dollars, he does not thereafter lie idle one-third of the time and live as he lived before; but he almost at once expands his wants so as to absorb his income, and works as hard as ever to get more. That there will ever be a more general diversion of the excess of human energy over the amount needed to secure a comfortable existence from material production to the culture of the man, we will not promise. But such an increase of culture is evidently made possible by the improvements in transportation, through which the old wants can be satisfied with less than the old amount of time and labor. It is at least permitted to us to hope that a considerable part of this great saving of time may be employed in the highest pursuits of man. The railroads, steamships, telegraphs, power looms, reaping machines, and the like, however, certainly do add to the powers of man, available for all pursuits of which he is capable: that they do not of themselves refine his tastes or elevate his aims can hardly be charged against the improvements. We should not find fault with a hammer because it is not a lily, nor with a steam engine because it is not an affection nor an inspiration.

The indirect effects of railroads have been less foreseen and provided for and are probably now much less appreciated than their direct effects. But there can be no doubt that the organization of modern society has been largely affected by them. The world is becoming homogeneous, and nations are so to an extent hitherto impossible. All men are neighbors and exert a reciprocal influence on each other. More than that, there is an actual admixture of peoples such as was never known before, of which this country is doubtless the most striking illustration. Here the heterogeneous elements are producing a homogeneous compound, but it is a new one whose special character we do not yet fully know. Elsewhere there has been not so much an admixture of different nationalities as a fusion of the different elements of single nations, a process which is tending to destroy provincialism. And while thus unifying populations, the new transportation has greatly facilitated the government of large nations, and indeed has made possible and advisable uniform methods of administration over wide areas, where formerly the varied characters and habits of the population made a uniform system undesirable and the difficulty of passing over great distances made such an administration almost impracticable. This tendency to uniform government does not always show itself in centralized administration by any means, but often in the growing similarity of distinct adjoining governments.

But the development of railroads has also made it necessary to solve some problems directly connected with themselves, which were new and extremely difficult. First, of course, were the engineering problems, and it is in these, doubtless, that the greatest progress has been made heretofore. A great deal of room is left for further progress; but it is doubtful if this progress will be as rapid hereafter as it has been heretofore. It is this side of railroads

which has attracted the general attention of the world. An immense deal remains to be done to put railroads and their equipment and appliances in the best condition now known, but this is a very different thing from discovering the improvements. Moreover, the great improvements in metals and the methods of working them, made of late years, indicates the way to improvements in railroads and rolling stock, which will be practicable as soon as we have learned to produce the improved metals cheaply. Bessemer metal has already done much, and its success indicates somewhat the results to be attained by the use of metals of the quality of compressed steel and phosphor-bronze, with which rolling stock could be made stronger, more lasting, and at the same time very much lighter. But a better metal needs only to be supplied before the better structures made practicable by it will appear. They do not need to be invented.

But in the field of administration it is reasonable to suppose that we have but begun to learn. Railroads were the first commercial organizations calling for the management of a property worth many millions, a business extending over hundreds or thousands of miles, and an army of men of many different special occupations. The amount of property is so great that it can usually be owned only by an association of capitalists; the business is so complicated and technical that it can be conducted only by a man having a special knowledge of it; it is so extended and varied that it requires experts in many different lines, who must be depended upon as authorities in their respective spheres; the different branches are so inter-dependent that they must at all hazards be made to work together—in short, the working of a railroad is a great administrative task, requiring the very best ability and a most carefully-planned system to make it thoroughly effective. It is so hard to make men do their best when they do not get all the benefit of their extraordinary exertions; it is so hard to make them economical when a corporation and not themselves profit by their saving; it is so hard to secure perfectly honest men in positions of trust where it is easy to make private gains at the corporation's expense with little risk of detection, that probably no railroad corporation in the world has been able to work with as much economy as even firms employing immense forces. The average effectiveness of the individual is less when working for the great corporation than when working for a firm—much less than when working for himself. This is an evil probably inseparable from corporate management so long as human nature remains what it is. It is the problem of administration to diminish this evil as much as possible.

Probably in most parts of the world the period of very rapid construction of railroads of the type now prevailing is passed. Civilized countries are now pretty well supplied with great traffic routes. There seems good reason to think, however, that that very light and cheap railroads may take the place of ordinary highways to a great extent. If made so that the freight cars of the heavy roads can pass over them (as they have been sometimes, and always can be), and limited to the very low speeds at which alone a very thin traffic can be economically conducted, they might very well within a moderate period rival in extent the principal lines; but of heavy railroads intended for fast passenger trains, the world has probably built many more within the past fifty than it will in the coming fifty years. This is a great advantage. A large proportion of the accumulated capital of the world has been of late invested in this costly machine for facilitating exchanges. So far as it is now supplied with railroads, the accumulating capital is left free for other useful purposes. And the energy and talent heretofore largely expended in their construction, we may expect hereafter to be directed largely to improving them and working them more effectively and economically. Special applications of railroads, such as their use for city and suburban traffic, may receive more attention, and it is reasonable to suppose that we will be able to reap greater and greater advantages from this comparatively new instrument.

There are some who are disheartened at the evident great imperfections in railroad transportation as it exists, especially when they see, as often happens, that recognized reforms are not introduced. But these imperfections are naturally to be expected in a comparatively new art, especially since hitherto most attention has necessarily been paid to the construction of roads and rolling stock. To an earnest railroad man they should rather be an incitement to make his best efforts. He has an opportunity not merely to what he has been taught to do, but to do better than he has been taught—to make visible progress in his art. And if he finds that it is not enough to find a better way in order to have it adopted—that routine, carelessness, stupidity, selfishness and venality stand in the way of progress, why, he must remember that these also are obstacles to be overcome no less than mechanical difficulties or complications in conducting business; that, indeed, these are the great obstacles to all reform, especially in great administrative bodies, corporate or governmental, and that he must learn to overcome them. A stupid superior is certainly a much more

disheartening obstacle than a defective material; but it is nevertheless a duty to do one's best in spite of either.

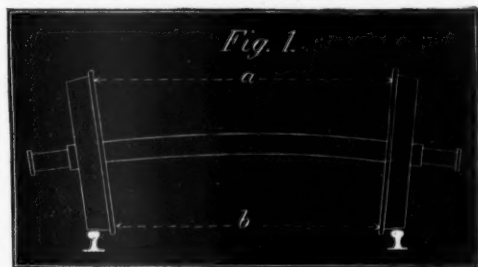
CAR AXLES.

At the last convention of the Master Mechanics' Association a report was made by the Committee on "Standard Axles," in which it was recommended that the above Association should adopt the same standard for car and tender axles that the Car-Builders' Association adopted a year or two before. The subject was fully discussed, and resulted in the non-concurrence of the Association with the committee's recommendation, which left the Association in the same position that it occupied before the committee made their report.

There can be no doubt that, had the Master Mechanics' Association recommended the same standard that the Master Car-Builders' did, it would have hastened the general adoption of that form and size of axle. Meanwhile, many of those axles are coming into use, and experience is rapidly demonstrating whether the action of the car-builders was wise or not.

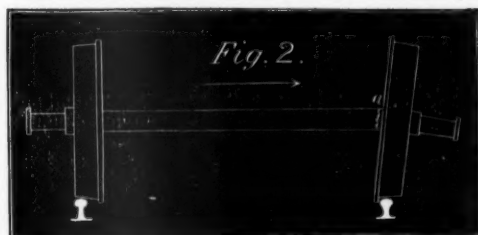
During the discussion referred to, it was stated that the improvements which have been made and the facilities which now exist for the manufacture of steel have practically given us a new material for axles, of very much greater strength than iron, and, therefore, while the dimensions of the Master Car-Builders' standard may be correct for iron, that much better proportions are possible for steel axles. Thus it is said that in order to get the requisite amount of surface on the journals so that the pressure of the bearings will not be too great per square inch, it is necessary to make the former not less than seven inches long. If they are made of that length, however, it was thought that in order to give them sufficient strength they must be made $\frac{3}{4}$ inches in diameter if the axles are made of iron. If they were made of steel, however, which is a stronger material than iron, it was argued that the requisite bearing surface could be secured by lengthening the journals without increasing their diameter materially. By this means it was said that a large bearing surface could be secured, and a correspondingly low co-efficient of friction due to the better lubrication resulting from having the pressure on that surface distributed over a larger area, and, at the same time, the diameter of the journal being

car-builders, and experience in the use and construction of railroad machinery, we never heard before. Both steel and iron crank-pins are extensively used on locomotives, but we never heard it intimated that steel was more liable to heat than iron. Cannot the *Iron Age* give a "bill of particulars," that is, his authority for the assertion? Who are the gentlemen who have used steel axles; what were the circumstances and on which roads were they tried? Our contemporary advocates the use of



the Master Car-Builders' standard axle, but, we believe, tries to sustain a good cause by wrong arguments and an inaccurate statement of facts. It is not only for the sake of uniformity, but for other reasons, important that the form and proportions of the axles should conform to those of the Master Car-Builders' standard.

When an axle is loaded on the journals, the tendency is



to bend down under the load and deflect upward between the wheels, as is shown to an exaggerated degree in Fig. 1. We have been told of some experiments made with the wheels under a sleeping car, which indicated that the deflection of axles is greater than is ordinarily supposed. The experiments referred to were simply the measurement of the distance a between the flanges of the wheels



small, the leverage exerted by the wheel to overcome the resistance at the journal would be greater than if the latter was larger in diameter.

In order to show that steel is very much stronger, or rather tougher, than iron, some tests were made at the time the convention was held in New York of both iron and steel axles. A report of these tests was published in the *Railroad Gazette* of May 29. They showed conclusively that the steel axles tested were very much tougher than the iron ones.

With reference to these experiments, the *Iron Age* some months ago made the following comment: "If tests by means of weights subjected an axle to strains in any respect similar to those it encounters in actual service, the results might be considered conclusive; but they do not; consequently they are practically valueless as determining whether steel is, or is not, a better material than iron for this use." Now we are at a loss to know what sort of strains are liable to fracture an axle which toughness would not help it to resist. It is quite true that the test employed in the experiments referred to would not be conclusive as to the uniformity of the quality of any given lot of axles from which one or more examples were selected for testing, and it is with reference to the question of uniformity of quality in steel axles that most care should be exercised. Manufacturers, we believe, claim that they can now produce steel not only for axles, but for rails, boiler plates, and for any other purpose, of uniform quality, so that no more risk need be encountered in this respect in the use of steel than in that of iron.

Our contemporary also objects to the use of steel axles because of their liability to heat. Or, to quote the language literally: "Steel axles have been placed under cars on several different railroads by gentlemen with whom we are acquainted, and in each case they were abandoned on account of their liability to heat. We know this as a fact, although we do not know the reason for it." Now this fact is certainly very interesting, but it is one of which after years of more or less intimate interview with practical

at the top and at the bottom *b*. It was found that the distance at the top was constantly from $\frac{3}{8}$ to $\frac{1}{2}$ in. greater than at the bottom, no matter what position the wheels were placed in. Mr. Garey, Superintendent of Cars on the New York Central & Hudson River road, loaded a platform car which had the Master Car Builders' standard axles under it, and he found that one pair of the wheels measured constantly 3-16 in. more at the top than at the bottom, whereas the other pair maintained a uniform distance between the flanges both at the top and at the bottom. The experiments first referred to were made with a lighter axle than the Master Car-Builders' standard, which of course would be likely to spring more than heavier ones would. The fact that a very large proportion of axle journals wear most next to the wheel also indicates that the deflection causes the weight to bear most at that point. Of course, whenever this deflection takes place, it produces a bending action alternately back and forth at every revolution of the wheel, which no material is capable of resisting for a very long time. It is therefore important that a steel axle should have *stiffness* as well as *toughness*, and in determining their dimensions the former should be regarded quite as much as the latter. Now while steel may be very much tougher than iron, as was shown by the experiments, there is at the present time no reason for thinking that steel having that quality is any stiffer—that is, that it deflects less under the same loads—than iron. We all know by experience that a piece of wire, no matter how tough, may be broken by alternately bending it back and forth, so that it hardly needed scientific investigation to prove that the deflection of an axle first in one direction and then in the other during each revolution would have the same effect on it that the bending has on the wire. Broken journals very often show that the fracture commenced exactly as it does in the wire—that is, it begins at the surface and gradually penetrates toward the center until it becomes too weak to carry the load. Recent experiments have also shown that a bar of iron subjected to alternate tension and compression

sion will be fractured by a very much less strain than is required if it be applied in only one direction.

It may, however, be safely asserted that a much larger number of breakages of axles occur at the inside of the hub of the wheel than at the journal. This is due, no doubt, partly to the bending effect already referred to, but probably more to the strain produced by the lateral motion of the car, which motion is suddenly checked by the flange of the wheel coming in contact with the rail. The tendency of this is to bend the axle just inside of the hub, as shown at *a* in Fig. 2. There has been a good deal said, apparently without much foundation of fact to rest on, of the crystalization of the metal at this point. Whether iron does crystalize or not, or rather whether it undergoes any molecular change, from being subjected to constant vibrations or strains, which weakens it, is still a disputed point. Whether what we have been in the habit of calling the elastic limit has any existence in fact is also doubted. There can, however, be no question that with a certain amount of strain the particles of metal begin to separate or lose their cohesive power, and that if such strains are repeated often the material will be ruptured. Now the fact that car-axles break oftener near the inside of the hub than anywhere else indicates that they are subjected to more or greater strains at that point than at any other, and therefore it would seem to be an inference of common sense that there should be more metal there to resist these strains. In other words, the reason they break at that point is because they are not as strong there as they should be.

- One of the things aimed at in this Master Car-Builders' standard was to increase the strength at the weakest places. When this was done it was objected that the weight of the axle was too great, and a great deal has been said about dead weight, increased cost, etc., etc. The fact that the weight of this axle was greater than others led Mr. Garey, of the New York Central & Hudson River road, to reduce it as far as was possible. As the dimensions of the journal and in the hub of the wheel were fixed, there was of course no chance for reduction there: but as axles never broke anywhere between the wheels, excepting close to the hub, he diminished the weight by reducing the diameter, commencing at a point about $2\frac{1}{2}$ in. inside of the hubs, as shown in our engraving, fig. 3. The axles thus made weigh 340 pounds finished. We have, before us a drawing

of an axle with $3\frac{1}{2} \times 6$ in. journal which weighs 310 pounds. The passenger car and tender axles used on the Philadelphia & Reading road weigh 387 pounds. There is, therefore, we believe, much less reason for objecting to the standard axle because of its weight than is usually supposed, and we believe that even if steel is employed instead of iron the Car Builders' standard will in practice give very much better results than a smaller size would.

The Master Car-Builders' Monthly Meetings.

The first of these meetings for the fall and coming winter was held in the rooms of this Association at No. 113 Liberty street, New York, on Thursday, September 23. The meeting was of a preliminary character and intended to make arrangements for the succeeding meetings. Those held last winter were most of them very successful, and brought together a large number of practical men and elicited a great deal of information and interest, which has since then been, we believe, of great pecuniary advantage to railroad companies. The discussion of the "wheel question," as it is called, has drawn the attention of railroad men to this subject and led to a much more careful investigation of the service of the wheels in use. It is the habit of some railroad officers to withhold their support and encouragement from all such meetings because they are not conducted according to some ideal or preconceived method which they have cherished in their own inner consciousness. Now it is true that the meetings to which we have referred are not all that such meetings might be, but they have succeeded in bringing together men with practical experience and those engaged in scientific research. This afforded an opportunity for comparing their views, and has set, at least, the practical men to thinking and investigating as they never have before. There are, of course, other subjects besides those which have been discussed, which will be brought up hereafter, and are of very great importance, and likely to call out an equal amount of valuable information. The chief advantage, however, of such conferences is the interest which they arouse. Every man who goes there on his return to his shop is apt to look into matters which never attracted his special attention before.

The meetings are conducted in the most informal way. They

are open to anyone who desires to come, and the discussions are, as it were, public ground—at least no restrictions have thus far been laid on anyone who chose to take part in them. Last winter a number of gentlemen interested in scientific investigations were invited to address the meetings, which they did on some subject in which those present were interested. Dr. W. C. Tilden spoke one evening of the preservation of wood; Mr. L. W. Leeds at another meeting spoke of ventilation; Professor Thurston exhibited and explained his machine for testing the qualities of metals and other materials, and Professor Wood discussed the strains to which car-bodies are subjected. These addresses were followed by informal discussions, which, as we have already stated, were open to all.

The arrangements for the meetings are made by the Committee on Rooms, who select the subjects for discussion and arrange the order of business. It has been determined this winter to admit papers on other subjects pertaining to railroads besides car-building, but, owing to the great interest manifested on the subject of car wheels, it will be brought up again for discussion at the next meeting. A circular has been addressed to manufacturers of wheels requesting them to send written communications on that subject which will be read and discussed. It is also the intention of the Committee on Rooms to invite persons who have made some subject pertaining to railroads a special study to prepare papers or give plain informal talks on them. By this means, what is now so much needed will be accomplished, that is, practical and scientific men will be brought together.

We believe that all railroad officers would find it interesting and profitable to attend these meetings, and if they do so, that the usefulness of the discussions may be very much increased. What is aimed at is simply to bring together railroad men and others interested in the same subjects, and make a sort of common store-house for whatever knowledge or experience each may have.

The Distribution of Rail Production.

The rail production of the United States is distributed among the States in proportions such as most of us would hardly guess from a general knowledge of the centers of iron production. In 1874 Pennsylvania stood first, it is true; but Illinois—land of corn and wheat, of cattle and hogs, but hardly counted among iron-producing States—stood second, and, too, produced nearly half as many tons of rails as Pennsylvania and more than a sixth of the total production of the United States. Ohio was only third, Maryland fourth and New York fifth.

The States where the rolling of rails shows the most tendency to grow will be best found by comparing the percentages of the total production of each year rolled by each State, as follows, the percentage of production being given for every State that has in any one of the four years produced as much as 1 per cent. of the year's total:

	1871.	1872.	1873.	1874.
Pennsylvania.....	43.2	41.9	36.9	35.5
Illinois.....	11.7	10.7	15.4	17.2
Ohio.....	9.8	12.2	6.7	11.3
Maryland.....	5.8	2.6	4.4	6.6
New York.....	11.2	8.2	4.7	6.4
Wisconsin.....	3.7	3.7	3.8	4.1
Massachusetts.....	3.7	2.9	3.0	3.4
Missouri.....	1.1	1.6	1.6	3.3
Indiana.....	1.6	2.4	1.9	2.8
Maine.....	1.7	1.4	1.6	2.0
Tennessee.....	1.2	1.5	1.5	1.9
Vermont.....	..	..	0.7	1.4
Georgia.....	1.0	0.7	0.9	1.1
Kentucky.....	0.8	0.4	1.3	0.9
New Jersey.....	0.8	0.9	1.5	0.5
Michigan.....	1.8	1.0	0.5	0.3

Here Pennsylvania is seen to have begun in 1871 with three-sevenths of the total production, and to have produced a smaller and smaller proportion yearly. The proportion of New York has also decreased. The chief increases in proportions have been in Illinois, Ohio, Maryland, Wisconsin, Missouri and Indiana. In Pennsylvania and Maryland, and further east, 66.6 per cent. of the whole was produced in 1871, but only 55.8 per cent. in 1874. In the States west of Pennsylvania and north of the Ohio the production was 29.7 per cent. of the total in 1871 and 40.2 per cent. in 1874.

This shows a decided westward movement of the rail-rolling industry. This is natural, in view of the fact that a large part of the rolling is re-rolling, for which the material comes from the railroads themselves; and fuel must be very costly and labor very high where it will pay to ship old rails eastward a thousand miles or so to a rolling mill, and then ship them back to the railroad. But if we take the new rails only, the West still shows a large proportion of the production. In 1874 it produced 38.3 per cent. of the new rails, and the Eastern States grouped together about 60.2 per cent. The figures for new and re-rolled rails are not given separately for the previous years, but it appears that the production of new rails has increased faster in the West than the production of re-rolled rails.

Rails are carried from the East to the West at very low rates, because of the great numbers of cars going empty in that direction. But even at half a cent per ton per mile, the charges for a thousand miles amount to \$5, which gives a very considerable advantage to the Western mills in supplying the Western demand.

To the Grave by Rail.

The above title is not intended to refer in any way to the danger of traveling by rail, but only to a new car just completed for the New York & Harlem Railroad to be used to carry persons to their last resting place at Woodlawn Cemetery, which is on the line of that road. The car is of the ordinary size of passenger cars, but has a portion divided off into a compartment with folding doors between it and the body of the car. In this compartment is a movable platform for the reception of the coffin, and suitable shelves are placed on each side for flowers. There are side doors on each side of the compart-

ment for depositing and removing the coffin to and from the car.

The seats are arranged in the usual way, the floor neatly carpeted, and the car is heated with one of Baker & Smith's hot-water heaters. The usual ventilators are placed in the raised roof or clear-story, and also at the ends over the doors. Besides these, there are ventilators under each seat which communicate with openings at the roof by passages in the sides of the car between the windows. Suitable closets are placed at the one end of the car, one of them for the Baker & Smith heater. In the compartment are other closets for the reception of such tools, signals, etc., as are likely to be needed on the road. The car is finished with bird's-eye maple and mahogany, and the seats upholstered with crimson and green plush.

Altogether the car is a beautiful piece of work, and everything indicative of the gloomy service in which it is to be employed has been carefully avoided. As some one remarked, any one might go to Woodlawn in this car and bury his mother-in-law, and come home feeling satisfied.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Woodstock.—Extended eastward 11 miles to Woodstock, Vt., completing the road.

Connecticut Central.—The first track has been laid from East Hartford, Conn., northward 4 miles.

This is a total of 15 miles of new railroad, making 761 miles completed in the United States in 1875, against 1,082 miles reported for the same period in 1874, 2,691 in 1873, and 4,765 in 1872.

AN INSPECTION LOCOMOTIVE has just been completed by Mr. Wm. Buchanan, of the Hudson River road, for the use of the Superintendent and other officers of that line. It was originally one of a number of tank locomotives used on that road, having had one pair of driving-wheels and two trucks, one under the smoke-box and the other behind the fire-box. The frames are extended back far enough to receive a water-tank and fuel-box, which are carried by the rear truck. A large cab has been placed on top of the boiler, from which an excellent view of the road can be secured. Revolving chairs are placed in the cab for the accommodation of those using the engine. Access is had to this cab by means of a stairway at the front end similar to those used in double-deck horse cars. The engine also has a new vacuum brake, but the name of the inventor has escaped us.

The engine is finished very neatly and the portion of the cab occupied by the locomotive runner looks as brilliant as a Pennsylvania Dutch kitchen. The appearance of the engine bears the same relation to that of other locomotives that a fancy yacht does to other water craft. As the engine has but one pair of wheels, we would suggest that it be called the rotifer or monopolotous—see Webster's Dictionary.

THE CALIFORNIA & TEXAS CONSTRUCTION COMPANY, which had the contract for building the Texas & Pacific Railway, had a great amount of paper outstanding at the time of the panic, and being unable to meet its obligations, settled with some of its creditors by giving them its notes endorsed by Thomas A. Scott, President of the Pennsylvania Railroad Company, and Matthew Baird, formerly proprietor of the Baldwin Locomotive Works, who were perhaps the largest stockholders in this company. It was feared by many that these endorsers would not be able to pay these notes at maturity, it having been currently reported that the Texas & Pacific had ruined them; but they now advertise in the Philadelphia papers that they, "desiring to place all parties holding the notes of the California & Texas Railway Construction Company, with our joint names endorsed thereon, in possession of the amounts of money that would be due them, with interest to date of presentation, will purchase said notes on and after this date (Sept. 18), at par, less rebate of interest until maturity," on their presentation to their agent in Philadelphia, with the collateral belonging to them. These notes mature at various dates up to April 13 next.

THE COST OF RAILROAD ACCIDENTS in Great Britain during the year ending with June last amounted to £600,000, equal to about \$3,900,000 in our currency, solely in the sums paid for damages, of which 56½ per cent. was for damages to passengers and the rest for freight. The latter amount doubtless included much not due to any accidents to trains, however. Besides this, there was the damage to rolling stock and other company property, the amount of which can only be guessed at, but must have been large. The London & Northwestern alone paid \$758,000 gold for damages.

HOP-PICKING gives a special traffic to the railroads leading from London southward, where there are immense plantations of hops, which have to be picked within a limited period, requiring a force much larger than that engaged in cultivating the plant. During the first half of September two of these companies ran special trains especially to carry the hop-pickers, who are people of all ages and both sexes, generally the very poorest people of the city, who for this short season get a taste of country life and, for them, good wages.

AMERICAN PASSENGER CARS seem to have found some favor in England since the Pullman cars were first introduced. A recent number of an English journal says that besides the 36 Pullman cars which the Midland has completed, or nearly so, on its line, it has also 32 other cars of the American pattern—supported on trucks, with end entrances, and a central passage-way—which are used for ordinary first and third-class traffic, this road having no second class.

NEW PUBLICATIONS.

The Mechanic's Friend; a Collection of Receipts and Practical Suggestions. Edited by William E. A. Axon, M. R. S. L., F. S. S., etc. etc. New York: D. Van Nostrand, 1875. pp. XII. 339.

This work is principally a compilation from the correspondent's column of the *English Mechanic*, a journal which devotes a considerable portion of its space to the publication of questions on mechanical and scientific subjects, and answers to the same which are returned by its correspondents. If one could feel sure that each of the numerous receipts which it contains had been tested and approved in practice, the value of the work would be very great; still, so far as our observation goes, the present work will compare very favorably in this respect with most of its predecessors. The receipts, too, cover a wide ground, and appear on the whole to have been judiciously selected. The book contains, in addition, a variety of hints on practical details, being adapted, according to the editor, to the wants of persons who desire "to skeletonize the leaf of a plant, or to construct a steam propeller for a model boat; to make a sky-rocket or an electric clock; an artificial magnet or a photographic handkerchief." In the preparation of this portion of the work, it appears to us that the editor has not been as careful as was desirable. The selection of topics is very well made, but many of the descriptions and directions are so vague that they will prove of little benefit to any but those who are already pretty well acquainted with the subjects. For instance, we imagine that the amateur who had no previous acquaintance with the following matters, would find it difficult, if not impossible, to construct the "air-engine," "the rifle stadia," or the "sun-dial," from the directions given in this book. It would be unsafe, also, for the tyro to trust too implicitly to the rules and methods relating to the steam engine, even if he should succeed in discovering the meaning of the formula for governors, on page 107:

"The rule now is—

$$\sqrt{\frac{187.5}{\text{Vertical height in inches.}}} = \text{revs. per min.}$$

The portions of the book most likely to instruct railroad men are those referring to cements and glues, varnishes and lacquers, the steam engine, railway signals and locomotives, electricity, magnetism and telegraphy. The book is neatly arranged and bound, but a little more care in printing the woodcuts would have improved its appearance.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Cincinnati, Hamilton & Dayton.—Mr. A. H. McLeod has been appointed General Freight Agent and will take charge of his department Oct. 1. Mr. McLeod was for several years with the Baltimore & Ohio, then Assistant General Freight Agent of the Pittsburgh, Washington & Baltimore, and has for some time past been General Manager of the Diamond Fast Freight Line, which he organized, over the Erie and Canada Southern.

Syracuse & Northern.—The purchasers of the Syracuse Northern road at foreclosure sale have organized a new company by this name and have elected the following directors: Marcellus Massey, F. S. Massey, Moses Taylor, Samuel Sloan, John T. Denny, C. Zabriske, R. G. Rolston, J. W. Moak, J. S. Lawyer, Theo. Irwin, Geo. B. Sloan, John Brislin, B. G. Clark.

St. Louis & Southeastern.—The St. Louis Times says: "Some important changes are taking place in the management of the Southeastern. The fact has not been formally announced yet, but it is credibly reported that General Minty has become Superintendent of the whole line, and Geo. S. Winslow (brother of General Winslow, the President) Assistant Superintendent. Formerly General Minty was Superintendent of the Nashville Division, and Geo. S. Winslow, of the St. Louis Division. * * It is further reported that General Passenger Agent Mass is to assume, in addition to his present duties, those of General Freight Agent."

Cincinnati, Lafayette & Chicago.—Mr. M. H. Keith has been appointed Auditor, in place of Chas. E. Waldron, deceased. All communications pertaining to his department should be addressed to him at Lafayette, Ind.

Nashville, Chattanooga & St. Louis.—At the annual meeting in Nashville, Tenn., Sept. 15, the following directors were chosen: E. W. Cole, J. M. Bass, G. M. Fogg, G. M. Fogg, Jr., B. F. Wilson, J. A. Satterwhite, H. C. Shepherd, Nashville, Tenn.; E. L. Jordan, John W. Childress, Murfreesboro, Tenn.; Thomas G. Whiteside, Thomas Lipscomb, Shelbyville, Tenn.; W. S. Huggins, N. C. Collier, Coffee County, Tenn.; Vernon K. Stephenson, Adrian Iselin, New York. The new directors are Messrs. Satterwhite and Shepherd, who replace J. Frizzell and John Porterfield. The board re-elected E. W. Cole, President R. C. Bransford, Secretary and Treasurer; J. W. Thomas, General Superintendent; T. D. Flippin, General Bookkeeper; B. C. Morris, Resident Engineer.

Paducah & Memphis.—Mr. J. W. Wilbur has been appointed Superintendent, in place of J. G. Mann, resigned. He will have his office at Paducah, Ky., and will also act as terminal agent for the road at that point.

Portland & Rochester.—Mr. W. R. Wood, of Portland, Me., has been chosen a director, in place of R. E. Wood, deceased.

Mississippi River & South Missouri.—The first board of directors of this new company is as follows: Courtland Palmer, Hugh N. Camp, J. Wyman Jones, C. B. Parsons, Don McN. Palmer, C. A. Barwise and Wm. S. Relfe.

Michigan Central.—Mr. August Belmont, of New York, has been chosen a director in place of Mr. H. H. Hunnewell, of Boston, resigned.

Burlington & Northwestern.—Messrs. Charles Mason and John M. Gear have been chosen directors in place of Messrs. Jackson and Wallace, resigned.

PERSONAL.

—Mr. John D. Van Buren, the Democratic candidate for State Engineer and Surveyor of New York, and a member of the Canal Commission appointed last year by Governor Tilden, is not, as such candidates usually have been, an active politician, and is, as such candidates sometimes are, of high standing in his profession. Mr. Van Buren was graduated from the Rensselaer Polytechnic Institute at Troy in 1860, at the head of his class. He accepted an appointment as Assistant Engineer in the United States Navy, in which he served until shortly after the close of the war, a large part of the time as Professor of

Experimental Philosophy and Physics at the Annapolis Naval Academy. He then studied law, but after being admitted to the bar resumed his former profession, and accepted a position as assistant to General McClellan when that gentleman was made Chief Engineer of the newly-organized Department of Docks of the city of New York, in which he did good service until he accepted his present position on the Canal Commission. Mr. Van Buren is a prominent member of the American Society of Civil Engineers, to whose Transactions he has contributed several valuable papers. He is also the author of a treatise on the "Strength of Iron Parts of Steam Machinery." Mr. Van Buren is said to have excellent natural abilities as well as professional culture and experience.

—Mr. Felix N. V. Spice, for six or seven years past Chief Clerk in the office of the General Freight Agent of the Baltimore & Ohio road, died in Baltimore, Sept. 22, aged 48 years. Mr. Spice was formerly Paymaster of the Sandusky, Mansfield & Newark, and was also at one time connected with the Cleveland, Columbus, Cincinnati & Indianapolis.

—A telegram from Louisville states that Mr. Albert Fink has resigned his position as General Superintendent of the Louisville & Nashville Railroad, for private reasons, after being connected with the company for 18 years. Mr. Fink is widely known not only as a capable manager, but as a close student of the problem of transportation and an able writer on subjects connected with railroad management and business.

—Mr. Albert W. Markley, Receiver of the Bridgeton & Port Norris Railroad, left his residence in Camden, N. J., Sept. 24, to go to Philadelphia, and his body was found the next day in the Delaware River. It is believed that he committed suicide, although no cause is known for the act except that he was suffering from a disease which at times was painful and troublesome. He was in good circumstances and his business affairs were in good order. Mr. Markley had been for many years connected with the Camden & Amboy and subsequently with the Pennsylvania Railroad Company in various capacities, and was well known as a lobbyist both at Trenton and Washington. He was a man generally liked as a companion and had many friends.

—Mr. C. E. Waldron, Auditor of the Cincinnati, Lafayette & Chicago Railroad, was accidentally shot Sept. 18. Mr. Waldron was at St. Mary's, Ind., and was going to the station in a wagon with several friends, when the jolting of the vehicle caused a loaded gun, which one of the party had, to go off, the whole charge lodging in his body.

—Mrs. Mary Martin, of Elk Ridge, Howard County, Md., desires information of her son, Anthony Martin, formerly a foreman on the Baltimore & Potomac Railroad, and left his place to work on Western Railroads. He is about 34 years old, about 5 ft. 7 in. high, weighs about 155 pounds, has dark eyes and black hair and a mark under his left eye caused by a railroad accident. When last heard from he was in Holden County, Missouri. His mother, who lost her husband two years ago, is extremely anxious to get news of him.

TRAFFIC AND EARNINGS.

Flour and Grain Movement.

For the week ending Sept. 18 receipts and shipments are reported as follows, flour in barrels and grain in bushels:

	1875.	1874.	Inc. or Dec.	P. c.
Flour:				
Lake ports' receipts.....	84,202	102,066	Dec.. 17,804	17.4
" " shipments.....	103,611	109,207	Dec.. 5,596	5.1
Atlantic ports' receipts....	175,994	189,018	Dec.. 13,024	6.9
Wheat:				
Lake ports' receipts.....	1,885,644	1,713,498	Inc.. 172,146	10.0
" " shipments.....	1,492,117	1,640,608	Dec.. 148,491	9.1
Atlantic ports' receipts....	1,455,066	1,683,890	Dec.. 228,824	13.6
Grain of All Kinds:				
Lake ports' receipts.....	3,878,940	3,500,277	Inc.. 378,663	10.8
" " shipments.....	3,853,150	3,075,032	Inc.. 778,118	25.3
Atlantic ports' receipts....	3,444,597	2,776,801	Inc.. 667,796	24.0

Of the lake ports' shipments of grain, 40% per cent. went by rail in 1875, 8% per cent. in 1874, and 28 per cent. in 1873. Lake rates meanwhile are lower than the lowest midsummer rates previous to this year.

Railroad Earnings.

Earnings for various periods have been reported by the following companies:

Year ending June 30:	1874-75.	1873-74.	Inc. or Dec.	P. c.
Ohio & Mississippi.....	\$3,083,360	\$3,122,502	Dec.. \$39,142	1.3
Expenses.....	2,242,611	2,191,308	Inc.. 51,303	2.3
Net earnings.....	\$840,739	\$931,194	Dec.. \$90,455	9.7
Earnings per mile.....	7.840	7.945	Dec.. 0.105	1.3
Per cent. of expenses.....	72.73	70.18	Inc.. 2.55	3.6
Eight Months ending August 31:				
Mobile & Ohio.....	\$998,309	\$1,319,955	Dec.. \$321,646	24.4
St. Louis & Southeastern.....	620,023	802,496	Dec.. 182,473	22.7
St. Paul & Sioux City.....	455,889	517,246	Dec.. 61,357	11.9
Six Months ending July 30:				
Logansport, Crawfordsville & Southwestern.....	\$125,423			
Expenses.....	169,307			
Deficit.....	\$43,884			
Earnings per mile.....	1.081			
Per cent. of expenses.....	134.09			
Months of August:				
Mobile & Ohio.....	\$112,873	\$116,638	Dec.. \$3,765	3.2
Philadelphia & Erie.....	333,420	349,518	Dec.. 16,098	4.6
Expenses.....	218,346	230,135	Dec.. 11,789	5.1

Net earnings.....	\$115,083	\$119,383	Dec.. \$4,300	3.6
Per cent. of expenses.....	65.49	65.84	Dec.. 0.35	0.5
St. Louis & Southeastern.....	73,613	110,924	Dec.. 37,311	33.6
St. Paul & Sioux City.....	69,455	72,936	Dec.. 3,481	4.8
First week in September:				
Osro & St. Louis.....	\$7,544			
Denver & Rio Grande.....	7,191	\$6,617	Inc.. \$574	8.7
Second week in September:				
St. Louis, Iron Mt. & So.....	\$93,322	\$69,816	Inc.. \$23,506	33.7
Two weeks ending Sept. 10:				
Great Western.....	\$33,467	\$38,820	Dec.. \$5,353	15.8
Two weeks ending Sept. 11:				
Omaha Trunk.....	\$72,600	\$88,600	Dec.. \$16,000	18.1

Coal Movement.				
Coal tonnages are reported as follows for the week ending Sept. 18:				
Anthracite.....	1875.	1874.	Inc. or Dec.	P. c.
Summit-Mitnious, Broad Top and Clearfield.....	543,320	421,912	Inc. 121,408	
Cumberland.....	24,537			
Barclay.....	65,152			
West'n Pennsylvania.....	7,805			
West Virginia.....	38,691			
Ohio, Western Pennsylvania.....	4,134			
15,282				

The coal tonnage of the Pennsylvania Railroad for the second week in September was:

	Tons.
Anthracite.....	22,039
Bituminous.....	63,632
Coal.....	15,282
Total.....	100,953

For the first week, the tonnage was: coal, 84,887 tons; coke, 16,573; total, 101,460 tons.

At a meeting of the representatives of the anthracite coal companies, the Philadelphia & Reading, the Delaware and Hudson Canal, the Lehigh Valley, the Delaware, Lackawanna & Western and the Lehigh & Wilkesbarre Coal companies, it was agreed to advance the prices of the smaller sizes of coal 10 cents per ton. The Delaware & Hudson Canal and the Delaware, Lackawanna & Western companies agreed to suspend shipments to competitive points for two weeks, confining their business during that time to their Western and local trade. Entire harmony is said to exist between the companies named in the management of the coal trade.

THE SCRAP HEAP.

How a Monkey Stopped a Train.

The Savannah News says: "We learn from our genial friend, Conductor S. K. Slawson, of the Savannah & Charleston road, that a day or two since the train coming to this city was stopped by a monkey while in rapid motion. It seems that the train was bowling along at the rate of 25 miles an hour, when suddenly 'down brakes' was sounded, the engine-bell ringing vigorously at the same time, and the locomotive came to a stop as the brakemen sprang to their posts. The conductor was rather mystified, and at once proceeded to investigate the matter. It was found that a monkey, which was confined in the baggage car, had broken loose, and was amusing himself by swinging on the bell-rope, and the engineer was thus signalled to stop. The explanation of the sudden stoppage caused much division among the passengers, and that monkey became quite a hero."

Baggage-masters will take warning accordingly, and see that the monkey, when there is such a passenger, is securely tied.

Railroad Manufactures.

The Cleveland Iron Company, of Cleveland, O., has the contract for the rails for the new Sharon Railroad in Western Pennsylvania.

Riehle Brothers, of Philadelphia, are making a testing machine for Cornell University to test metals, etc., by tensile, transverse and crushing strains.

The Terre Haute (Ind.) Car Works are building a lot of coal cars for the Evansville, Terre Haute & Chicago road.

The Indianapolis Rolling Mill Company recently completed a contract for iron rails to lay 20 miles of track on the Cincinnati, Hamilton & Indianapolis road, and have made another contract for iron to renew ten miles more of the same road.

The Terre Haute (Ind.) Rolling Mills have started up again. The Etowah Iron Works at Rome, Ga., have shut down on account of low prices and want of demand for iron. These are the works which shipped several lots of iron recently to England.

Messrs. Glass, Neely & Co., proprietors of the Keystone Iron Works of Pittsburgh, Pa., suspended Sept. 25 and closed their works. Liabilities are stated at about \$310,000, assets \$350,000. The principal portion of assets, consisting of mill property and real estate, is not available at present. The cause of the failure is the general stagnation of the iron business and the difficulty of realizing on outstanding indebtedness. The firm say they will pay all claims as fast as they can realize on their assets. Three hundred hands are thrown out of employment.

The Lochiel Iron Works, at Harrisburg, Pa., have started up again, after a stoppage of about three months, on two large orders for rails.

The Mason Machine Works, at Taunton, Mass., have been building some narrow-gauge engines for the Stockton & Lone Railroad.

The Danforth Locomotive Works, at Paterson, N. J., are building an iron bridge for the Delaware, Lackawanna & Western road, in the absence of locomotive orders other work being taken.

English Driving Wheels.

In answer to an inquiry, a correspondent of the *English Mechanic* has drawn up the following table, showing the diameters of driving wheels used for express trains on the following railways:

		ft. in.
Bristol & Exeter.....	single	9 0
Caledonian.....	single	8 2
Great Western.....	single	8 0
Great Northern.....	single	8 0
Great Northern.....	single	7 0
London & Northwestern.....	single	7 6
London & Northwestern.....	4 wheels coupled.....	6 8 1/2
London, Brighton & South Coast.....	single	7 0
London, Brighton & South Coast.....	4 coupled.....	6 6
Midland.....	4 wheels coupled.....	6 8
Midland.....	4 wheels coupled.....	6 0
Midland.....	single	6 8 1/2
London & Southwestern.....	4 wheels coupled.....	7 0
London & Southwestern.....	single	7 0
Southeastern.....	4 wheels coupled.....	6 0
Southeastern.....	single	7 0
London, Chatham & Dover.....	4 wheels coupled.....	6 6
London, Chatham & Dover.....	single	7 0
Great Eastern.....	single	7 0
Great Eastern.....	4 wheels coupled.....	6 0

This correspondent says:

"It must not be supposed that the companies which use the largest driving wheels have the best engines, or run the fastest trains. The subject of 'which sized wheels are best' has often been discussed in the *Mechanic*. 'An Express Driver,' vol. xix, page 71, gave us his opinion that, as wheels of 6 ft. 8 1/2 in. could run at a speed of 75 miles an hour, he did not see the use of wheels of a greater diameter than 7 ft., in which opinion I entirely agree. I observe, too, that the London & Northwestern is building large numbers of express engines, with four wheels coupled, of 6 ft. 8 1/2 in., with inside cylinders, instead of the 7 ft. 6 in. 'single' driving wheels, with outside cylinders, which they have now discontinued to build. The Midland Company have for years discontinued to build 'single' engines, and use engines with four wheels coupled of 6 ft. 8 1/2 in. diameter. The Brighton Company also is making engines of similar design, with coupled wheels of 6 ft. 6 in. diameter."

Another correspondent in reply to the same question says:

"The largest driving wheels in England are used on the Bristol & Exeter Railway. The broad-gauge express engines on that line are heavy tank engines, having a four-wheeled bogie at each end with driving wheels 8 ft. 10 in. in diameter, placed under barrel of the boiler. When first made in 1854 or 1855, the engines had 9-ft. wheels, but they have recently been rebuilt. A number of large express engines are employed on the Great Western Railway between London and Bristol (broad-gauge), with driving wheels 8 ft. in diameter. They also are very old engines, having been designed about 1848. The London & Northwestern Railway Company have one engine, 'The Cornwall,' built many years ago, with 8 ft. 6 in. wheels, but the standard express engines for running the Irish mail trains have driving wheels only 7 ft. 7 in. in diameter. The Caledonian Railway Company have some very fine engines built some years since, with 8 ft. 2 in. wheels, but the only company now building engines with very large wheels is the Great Northern, on which line the newest pattern of express engine has 8-ft. wheels, with a four-wheeled bogie in front. The Midland express engines have only 6 ft. 6 in. to 7 ft. wheels, and are chiefly four-coupled. The tendency just now is strongly in favor of smaller wheels, and few express

engines are now being built with driving wheels larger than 6 ft. 9 in."

An Old Engine for the Centennial.

The old "John Bull," the first locomotive ever run on the Camden & Amboy road, which has been laid up at the Borden-town shops for many years, is being put in running order again and will be sent to the Centennial next year. It was built by Robert Stephenson over 40 years ago; has 12 by 20-inch cylinders, one pair 4 1/2 feet drivers, and weighs about 12 tons.

Gas Reservoirs for Passenger Cars.

It is probably known to most of our readers that where ordinary illuminating gas is used for lighting passenger cars, it is carried in a reservoir attached to the car, generally underneath the floor. Into this reservoir the gas is forced by a pump, at a very high pressure, which is necessary in order that it may have sufficient head when it reaches the burner. Heretofore these reservoirs have been made of sheet iron riveted, but the National Tube Works Company, of Boston, is now making a large number for the Pennsylvania Railroad Company which are of lap-welded iron tubes, 14 inches in diameter. These are said to be the largest lap-welded tubes ever manufactured.

OLD AND NEW ROADS.

Alabama & Chattanooga.

A meeting of the first-mortgage bondholders was held in New York, Sept. 23, on a call issued by Mr. L. B. Binase, as representative of the foreign holders. There was considerable discussion as to disputing the prior lien on the road of the receivers' certificates. Holders of those certificates also addressed the meeting in their own behalf.

Another meeting, called by the trustees, was held in New York, Sept. 27, at which representatives of all classes of the creditors were present. Judge Grandin, counsel for the trustees, made a statement of the measures that had been taken to put an end to the long litigation in which the road had been involved. The Special Commissioners' report showed about \$1,200,000 indebtedness which was a prior lien to the mortgages. By the terms of the compromise the trustees' bid must be carried out by Oct. 11, or the road must be sold to pay court charges. Mr. Frost said that the amount to be paid to legal possession of the road from the trustees was \$209,464.67, including past due interest.

Mr. Stanton, one of the trustees and the leading man in the construction of the road, said that the trustees had tried to act honestly, but they had never been able to get the bondholders to do anything. He had superintended the building of the road. It had been decently equipped, but not as fully as it should have been. There were 20 locomotives, 200 box cars, 12 first-class and 8 second-class passenger coaches, plenty of mail and baggage cars, machine shops, with machinery sufficient to repair 300 or 400 miles of road and rolling stock, brick depots, and all other necessary appurtenances. It was true that in some parts temporary trestle-work had been constructed. This had been rendered necessary by excessive rains, which made it impossible to get seasoned timber to the ground, but the greater part had been well constructed. It had cost less than \$27,000 per mile, with iron at \$93 per ton, and labor at \$1.75 per day. It could not be done now for less, with iron at \$50 per ton and labor at \$1 per day, and other things proportionately cheaper. The trustees had placed \$4,720,000 of Alabama bonds at 90 at a time when they were being hypothecated here at 35. This and \$200,000 more, and \$2,000,000 of the straight debt, including the second mortgage bonds, and what is known as the \$500,000 overissue, was all the money they ever received from any source. It was true that 27 miles had been constructed before the trustees took hold, but there was not a sound cross-tie, trestle, culvert, or rail the entire distance. It was unsafe to take a hand-car over it, and the speaker was obliged to ride over it on horseback. For that the stockholders had paid \$700,000 more than it was worth. The total length of the road now is 290 miles. The day after the road was finished (May 15, 1871) the speaker ran a train of cars over it in thirteen hours. He then went to Washington, and by showing that he could beat every other line by eight to ten hours, obtained the mail contract from the North and East and the through express business. When he got back to Alabama he found that the State had seized the road for the non-payment of two coupons. He never saw property so destroyed as this then was. One new locomotive, which had cost \$15,000, was thrown by a drunken engineer in the employ of the State off the track and smashed to pieces. Another new one was hypothecated for \$10,000. A coal mine that had cost the company \$150,000 to open, with its mules, scales, etc., two and half miles of iron, ten miles of spikes and ten miles of fish-plates and bolts were sold and have never been accounted for. Seventy odd box-cars and five locomotives were thrown into a ditch, some of them being rendered useless for anything but kindling wood. The speaker saw and counted them. Under these circumstances he had gone in and fought the best he knew how without awaiting instructions. Mr. Stanton concluded by saying that the road is now worth more than people have any idea of, and he advised those interested to come to some agreement and get it out of the courts.

Mr. Snagge, who is representative of a number of the foreign first-mortgage bondholders, said that his clients desired nothing more than to put a stop to the litigation. They desired to secure what return they could for their investment.

A committee, consisting of Charles L. Frost, John Sickles and Joseph Morse, was appointed by the creditors to meet the representatives of the first-mortgage bondholders, and see if a compromise could not be arranged.

European & North American.

The committee appointed to investigate the condition of this company's affairs has agreed upon its report. A general meeting of the creditors will be called, to be held at Bangor, Me., Oct. 5. The members of the committee, it is said, feel confident that they can agree upon a plan of adjustment which will meet with the approval of all the parties interested.

At a meeting of the creditors held in London, England, Sept. 6, a plan of reorganization was submitted, the leading features of which were: 1. That three-fifths of all the stock issued by the consolidated European & North American shall be conveyed to trustees, to be held by them in trust for such of the holders of the floating debt of said railway as shall agree to extend payment thereof to said company for a term of time not exceeding six years. Such stock to be the absolute property of the above-mentioned holders of the floating debt *pro rata*. 2. To the holders of the floating debt. That they extend payment thereof for necessary period, and to take possession of the roads under said stock, and run them, devoting the net earnings thereof wholly for the first three years to the payment of interest on the funded debt, the repairs and improvements of the roads, the payment of such debts as is necessary to prevent a sacrifice of the property, after which time the balance of net earnings shall be distributed among all the holders of the floating debt *pro rata*, but the dividends not to exceed the rate of interest on the funded debt until a resumption of payment of all the coupons and interest on the funded debt. 3. To the bondholders and holders of the funded debt. That they fund one-half of the coupons and interest for the term of six years into an income bond, payable in ten years, with interest semi-annually, upon condition that the net earnings of the road during that period shall be devoted to the purposes set forth in the proposition to the holders of the floating debt, and also to the general

bridges at High street, 55 feet span, \$4,400; Plane street, 55 feet span, \$4,400; Broad street, 110 feet span, \$11,000; Spring street, 65 feet span, \$5,500; raising present bridge over Ogden street with masonry, etc., \$46,400; rebuilding passenger and freight depots, \$20,000; new bridge and piers over Passaic River, \$121,820. The whole cost, including the necessary alterations of freight sidings, etc., is estimated at \$475,000.

It was stated that, while no decision had been reached, the company would doubtless be willing to make the alteration, provided the city would bear one-half the cost. If the matter is not settled soon the new bridge over the Passaic will be built on the present grade, after which the company will be unwilling to make any change.

The proposed alteration will take some 20 feet from the present very heavy grade between Newark & Roseville, but it will add the same to the East Newark grade. It will make it necessary to have a very heavy fill east of the Passaic River bridge, where the road is already at least 30 feet above the grade of the River Road, which it crosses just east of the river. The fill will be a long one, too, if the increased rise is distributed over a considerable distance, as it doubtless will be. The change will be of great advantage to Newark, and while there will probably be some opposition to the expenditure required of the city, it will be strongly advocated by residents of the district most directly affected, which is already populous and wealthy, and is also growing faster than any other quarter of the city.

Montclair.

This road was finally sold at auction under foreclosure of the first mortgage, in Jersey City, N. J., Sept. 25. It was bought by Abram S. Hewitt and Marcus L. Ward, trustees under the mortgage, for account of the bondholders, the price paid being \$200,000. The reorganization of the company will now proceed without further delay. The property sold includes the completed road from the junction with the Hudson Connecting Railroad on the Hackensack Meadows to Monks' Station, 33 miles, with a road-bed partly graded from Monks' to Greenwood Lake, and some right of way and grading done for a branch from a point near Montclair to Caldwell. There was very little equipment, most of that in use being hired or borrowed.

The amount of the first-mortgage bonds is \$1,800,000, and interest has been in default since September, 1873. The road has been twice sold, once under execution for a debt, and once under foreclosure of the second mortgage. The plan of reorganization adopted admits the holders of the second-mortgage bonds to the new company.

Illinois Railroad Taxation.

The Illinois State Board of Equalization has agreed upon the following valuations of the property of the various railroad companies of the State. The valuation includes road-bed, right of way, buildings and equipment, and is fixed on a basis of 50 per cent. of the cash value of the property.

NAME OF ROAD.	Length of Track.		VALUATION.
	Miles.	Feet.	
Baltimore, Pittsburgh & Chi.	5	3,916	\$44,169
Calo & St. Louis	145	1,136	338,690
Calo & Vincennes	149	88	450,489
Cardinal & Shawneetown	17	2,560	49,310
O & A. & St. L., St. L., Jackson-ville & Chicago, and Joliet & Chicago	547	5,260	3,879,563
Chicago & Ill. River	23	3,918	94,154
Chicago, B. & Q.	777	2,317	4,690,227
Chicago, Danville & Vin.	108	1,588	458,948
Chicago & Iowa	77	4,791	303,147
Chicago & Northwestern	453	440	3,370,704
Chicago, R. I. & Pacific	234	3,779	2,217,587
Chicago & Pacific	86	3,062	302,017
Chicago & Paducah	156	4,626	461,835
Chicago, Pekin & Southwestern	57	3,182	171,570
Cin. Lafayette & Chicago	33	288	164,917
C. C. & Indiana Central	27	5,230	198,278
Chicago, Mil. & St. Paul	44	3,223	404,644
Coal Valley Mining Co.	2	4,900	20,605
Chicago & Illinois Southern	29	.....	71,437
Evansville, T. H. & Chicago	6	1,320	31,122
East St. L. & Carondelet	9	1,320	33,355
Gilman, Clinton & Spring	110	4,709	368,813
G. T. M. & Mnf. & Trans. Co.	24	1,094	126,264
Hannibal & Naples	49	3,166	153,818
Iron Mountain, Chest. & East	41	1,735	122,225
Ill. & St. L. R. R. & Coal Company	14	3,380	214,378
Ind., Bloomington & Western	255	451	1,080,591
Indianapolis & St. Louis	183	.....	989,441
Indiana & Illinois Central	74	5,263	271,497
Indianapolis, N. W. & S. E.	30	4,079	104,359
Toledo & Northern Ind.	28	5,678	98,729
Lake Shore & Michigan S.	14	.....	258,713
Louisville, N. A. & St. L.	17	3,872	48,638
Lafayette, Bloom. & Miss.	76	4,637	234,067
Michigan Central	6	1,321	69,225
Madison County	8	.....	26,837
Ohio & Mississippi	146	1,678	699,369
Orion & Minersville	7	3,448	19,982
Paris & Decatur	73	440	264,178
Paris & Danville	66	2,520	189,810
Peoria, Pekin & Jacksonville	83	1,359	352,458
Peoria & Rock Island	90	1,934	297,537
Pittsburgh, Ft. W. & Chi.	14	3,785	210,585
Pekin, Lincoln & Decatur	67	1,833	209,079
Quincy, Alton & St. Louis	44	4,918	133,358
Rockford, R. I. & St. Louis	276	3,224	1,001,233
Springfield & Northwestern	45	1,056	112,064
St. Louis, Alton & Terre H.	69	4,816	455,234
St. Louis & Southeastern	190	.....	713,574
St. Louis, Vand. & Terre H.	189	2,708	881,092
Spring. & Ill. Southeastern	220	812	960,866
Stamford & Courtland	4	2,640	13,799
Toledo, Peoria & Warsaw	246	4,270	1,004,000
Toledo, Wab. & West., exclusive of trances assessed above, Pek. Linc. & Dec., Han. & Nap. and Laf. Bloom.	357	1,532	2,278,704
Union Railway & Trans. Co.	1	2,755	9,869
Western Union	126	2,961	452,458
Chicago & Southern	21	.....	69,997
Grand aggregate	6,214	3,063	\$32,243,429

The average valuation is \$5,188 per mile.

ANNUAL REPORTS.

Ohio & Mississippi.

This company has published, in advance of the annual meeting, a condensed statement of the operations for the year ending June 30.

The company's lines are as follows:

	Miles.
Main Line, Cincinnati, O., west to East St. Louis	340
Louisville Branch, North Vernon, Ind., south to Jeffersonville	53
Springfield Division, Shawneetown, Ill., north by west to Beardstown	228
Total	621

The last named line was formerly the Springfield & Illinois Southern road, and was purchased during the year. It was

operated only from March 1 to the close of the year, four months.

The earnings of the Main Line and Louisville Branch were as follows:

	1874-75.	1873-74.	Inc. or Dec.	P. c.
From passengers	\$1,072,386 42	\$1,011,098 98	Inc. \$61,287 44	6.1
Freight	2,160,672 07	2,329,744 50	Dec. 169,072 43	7.3
Express and mail	173,555 97	187,230 62	Inc. 13,674 65	26.5
Total earnings	\$3,406,614 46	\$3,478,074 10	Dec. \$71,459 64	2.1
Less transfers, formerly included	323,294 37	355,572 38	Dec. 32,278 01	9.1
Earnings	\$3,083,360 09	\$3,122,501 72	Dec. \$39,151 63	1.3
Working expenses and taxes	2,565,905 02	2,546,880 78	Inc. 19,024 24	0.7
Less transfers	323,294 37	355,572 38	Dec. 32,278 01	9.1
Expenses	\$2,242,610 65	\$2,191,308 40	Inc. \$51,302 25	2.3
Net earnings	\$840,739 44	\$931,193 32	Dec. \$90,453 88	9.7
Gross earnings per mile	7,845 07	7,945 30	Dec. 99 63	1.3
Net earnings per mile	2,139 29	2,369 45	Dec. 230 16	9.7
Per ct. of expenses	72.73	70.18	Inc. 2.55	3.6

The earnings of the Springfield Division for the four months were as follows:

From passengers	\$39,967 82
Freight	72,529 31
Express and mail	8,632 57

Total earnings (\$531.27 per mile) \$121,129 70
Working expenses and taxes (\$1.30 per cent.) 98,358 66

Net earnings (\$99.87 per mile) \$22,771 04

The disposition of the earnings was as follows:

Net earnings of all lines	\$863,510 48
Coupons on mortgage and on debenture sinking fund bonds	\$770,273 29
Second consolidated bonds bought for sinking fund	25,298 75
Debit sinking fund bonds bought for sinking fund	13,900 00
Consolidated bonds bought for sinking fund	36,000 00
Surplus	\$18,038 44
Add proceeds of sales 249 second consolidated bonds	199,200 00
Decrease floating assets	53,374 59
Increase current liabilities	133,543 93
Total	\$413,956 36

Construction..... \$68,820 50
Equipment, real estate, etc..... 64,701 86
Paid scrip issued Nov. 1, 1874, for preferred stock interest, due March 1..... 139,580 00
Half yearly interest on preferred stock, due March 1..... 140,854 00

The expenditures for construction on the main line were \$11,310, difference in cost of iron and steel rails; \$12,587.53, new sidings; \$6,894.59, fences; \$5,435.41, freight sheds at Cincinnati; \$260.43, depots and water stations, and \$198.58, connection with stock yards at East St. Louis. On the Springfield Division expenditures were \$358.18, depots and water stations; \$1,210.97, fences, and \$30,564.81 for new line from Pana to Tower Hill.

The current liabilities, less cash and cash items, were \$281,907.68. This includes \$118,511.83 on pay-rolls due next month.

Pittsburgh, Cincinnati & St. Louis.

This company works what may be called the Southern system of the Pennsylvania Company's lines west of Pittsburgh, which includes lines from the last-named city to Indianapolis, to Cincinnati and to Chicago by way of Logansport. It owns one-third interest in the St. Louis, Vandalia & Terre Haute Company, which owns a line from Terre Haute, Ind., to St. Louis, leased to and worked by the Terre Haute & Indianapolis Company. The company itself is controlled by the Pennsylvania Company, which owns a large interest in the stock.

For the fiscal year ending Dec. 31, 1874, the company worked the following lines:

	Miles.
Pittsburgh, Cincinnati & St. Louis, owned:	
Pittsburgh, Pa., to Newark, O.	160.00
Undivided half of 33 miles from Newark to Columbus	16.50
dix Junction, O., to Cadiz	8.00
Total owned	184.50
Chartiers Railroad, leased:	
Mansfield, Pa., to Washington	22.80
Cincinnati & Muskingum Valley, leased:	
Dresden, O., to Morrow	148.44
Little Miami, leased:	
Columbus to Cincinnati	190.00
Xenia, O., to Springfield	19.70
Xenia, O., to Richmond, Ind.	57.00
Columbus, Chicago & Indiana Central, leased:	
Columbus to Indianapolis	187.70
Bradford Junction, O., by way of Logansport, to Chicago	231.00
Richmond, Ind., by way of Logansport, to State Line	168.00
Total worked (including 33 miles worked also by B. & O. Co.)	1,155.64

The section of the main line from Newark, O., to Columbus, 33 miles, is owned and used jointly with the Central Ohio Company, whose road is worked by the Baltimore & Ohio. The Indianapolis & Vincennes road, though not leased, is worked in connection with this company's lines. The Jeffersonville, Madison & Indianapolis road, from Indianapolis to Louisville and Madison, though properly a part of this system, is leased and worked directly by the Pennsylvania Company.

The general account is summed up as follows:

Stock (common, \$2,500,000; preferred, \$5,925,450)	\$8,425,450 00
Funded debt	15,010,360 99
Deferred liabilities	1,373,078 30
Current liabilities	3,581,852 33
Total liabilities	\$28,390,641 62
Assets:	
Cost of road	\$19,753,883 23
Deferred assets	413,122 67
Due for betterments to leased roads	1,125,772 80
Securities owned	437,355 50
Current assets, cash, etc.	1,923,092 06
Total	\$23,655,226 26

Excess of liabilities..... \$4,735,415 36

This excess represents the net loss incurred in working the road and its leased lines up to the close of 1874. The stock is \$41,959 and the funded debt \$74,678 per mile owned. The reported cost of the road is \$98,278 per mile.

The equipment in use on the various lines was as follows:

	Engines.	Pass. train cars.	Frt. train cars.
Pittsburgh, Cincinnati & St. Louis	110	55	1,658
Cincinnati & Mus. Valley	15	16	361
Little Miami	46	54	691
Col. Chicago & Indiana Central	157	91	1,497
Total	328	216	4,207

The Chartiers road has no separate equipment.

The earnings of the Pittsburgh, Cincinnati & St. Louis proper were as follows:

	1874.	1873.	Inc. or Dec.	P. c.
From freight	\$2,683,317 53	\$2,872,999 12	Dec. \$189,681 59	7.6
Passengers	603,925 77	527,240 65	Dec. 76,685 12	14.5
Express	77,158 94	84,062 01	Dec. 6,903 07	8.2
Mails	37,200 00	50,400 00	Dec. 13,200 00	35.1
Rents, etc.	2,613 17	6,492 09	Dec. 3,878 92	59.7
Total	\$3,573,316 41	\$3,841,313 87	Dec. \$267,997 46	7.0
Work's expenses	2,576,534 02	3,362,915 84	Dec. 786,381 82	23.4
Net earnings	\$996,782 39	\$478,398 03	Inc. \$518,384 36	108.4
Interest	.....	11,270 00	Dec. 11,270 00	.....
Net revenue	\$996,782 39	\$467,128 03	Inc. \$529,654 36	109.6
Int't, disc't, etc.	843,096 33	732,674 47	Inc. 110,421 86	.....
Net profit	\$153,686 06	.....	.....	.....
Net loss	.....	\$243,105 44	.....	.....

The net profit on the business of 1874 is exclusive of the interest on \$5,000,000 second-mortgage bonds, which are owned by the Pennsylvania Company, the coupons from which have been withheld from collection by that company. The expenditures for betterments were \$71,538.89, against \$946,557.26 in 1873, a decrease of 91.5 per cent. The earnings per mile were \$17,778 gross and \$4,959 net. The expenses were 72.1 per cent. of earnings in 1874, against 88.2 per cent. in 1873.

The work done was as follows:

	1874.	1873.	Inc. or Dec.	P. c.
Train mileage	3,149,849	3,187,600	Inc. 37,751	1.2
Passengers carried	672,130	652,899	Inc. 19,231	2.9
Passenger mileage	28,322,181	28,381,094	Dec. 58,913	0.2
Tons freight moved	1,471,207	1,472,709	Dec. 1,502	0.1
Tonnage mileage	404,420,561	295,508,887	Dec. 1,086,673	0.4

Of the passenger mileage 43.5 per cent. and of the tonnage mileage 46.2 per cent. was of local business. The receipts and expenses per unit of traffic were as follows:

	Through.	Local.	Average.	Average Cost.
Per passenger per mile	2.40 cents	3.39 cents	2.54 cents	2.364 cents.
Per ton per mile	1.03 "	1.61 "	1.30 "	0.914 "

As compared with the previous year, there was a decrease of 0.4 per cent. in the average rate per passenger per mile, and of 7.1 per cent. in that per ton per mile. The expenses per passenger per mile decreased also 0.25 per cent., and per ton per mile 27.5 per cent.

The earnings and expenses of the leased lines were as follows:

	Chartiers.	Cin. & Mus. Valley.	Little Miami.	Col. Chi. & Ind. Central.
Freight	\$20,831 26	\$292,650 21	\$680,542 39	\$2,691,989 93
Passengers	45,652 25	119,125 89	524,207 08	979,677 82
Other source	4,872 56	18,062 64	123,862 97	192,165 17
Total	\$71,356 07	\$429,838 74	\$1,328,612 45	\$3,863,833 92
Work's exp's	52,504 97	439,428 85	1,072,186 63	2,929,842 39
Net earnings	\$18,851 10	.....	\$256,425 82	\$933,990 53
Deficit	.....	\$3,600 11	.....	.....

Receipts for interest, etc., 109,444 00

Rental, etc., 18,651 10

Deficit, 111,223 31

Gross earnings per mile, 3,120 88

Net earnings per mile, 818 03

Per cent. of expenses, 73.79

Per cent. in or dec. net earn. Inc. 1.9

Am't ex. for betterments, \$450 00

Of the rental charged to the Cincinnati & Muskingum Valley, \$105,000 are an advance, to be repaid from future earnings.

The work done on the various lines during the year was as follows:

dec.net earn. inc. 1.9	.....	Inc. 101.8	Inc 300	
Am't ex. for betterments	\$450 00	\$5,093 35	\$1,493 09	\$67,963
Of the rental charged to the Cincinnati & Muskingum Valley				
\$105,000 are an advance, to be repaid from future earnings.				
The work done on the various lines during the year was as follows:				
	Chartiers.	Cin. & Mus. Valley.	Little Miami.	Col. Chi. Ind. Cen.

road, the net loss on the whole system appears to have been \$620,422.71, to which might properly be added \$105,000 interest paid for the Cincinnati & Muskingum Valley, which is considered as an advance made to that company.

Concerning the Columbus, Chicago & Indiana Central lease, the report says: "Your special attention is also directed to the relations existing with the Columbus, Chicago & Indiana Central Company under the lease of that road. The covenants of that lease are so plain, and the obligations of that company so clear, that your board had hoped that the matter would have been amicably arranged on a satisfactory basis. But after waiting over four years, your board felt that their duty to the stockholders of your company would not admit of further delay. They, therefore, under the advice of counsel, duly notified the Columbus, Chicago & Indiana Central Company, on the 27th of October last, that, unless by the 1st of January, 1875, that company should carry out in good faith the covenants and agreements as set forth in the lease of February 1, 1870, this company would institute proceedings to compel a specific performance of such agreements, and, in the alternative, such relief as it might be entitled to in equity."

"This action was all the more necessary, as your company had been notified that a decree of sale had been entered against that portion of the Columbus, Chicago & Indiana Central line lying between Richmond and New Castle, Indiana, in proceedings instituted on a first mortgage, amounting, with accrued interest, to over \$900,000. The enforcement of such a decree would, of course, deprive your company of a continuous road, thus destroying the lease, and, by disintegrating the property, diminish its value."

"The Columbus, Chicago & Indiana Central Company having failed to meet these requirements by the time named, your company has filed a bill in chancery against that company, praying for the proper relief in the premises."

"It is a matter of regret to your board that it should have been necessary to resort to legal proceedings to protect your interests, but your company had already made large advances to the Columbus, Chicago & Indiana Central Company, and owing to the failure of that company to arrange, settle and adjust its indebtedness as set forth in the lease, in income bonds, several millions of dollars expended upon that line in bettering its condition were and are greatly imperiled."

California Pacific.

The report of this company to the Secretary of State of California for 1874 gives the following figures:

Capital stock (\$105,263 per mile).....\$12,000,000
Bonded and other debt (\$86,393 per mile).....9,847,609

Total (\$191,646 per mile).....\$21,847,609

The cost of the road is reported at \$19,782,639.84, and of equipment at \$393,335.89. The equipment consists of 22 locomotives, 24 passenger and 232 freight cars.

The earnings of the roads worked were as follows:

Gross earnings (\$9,246.19 per mile).....\$1,064,066 14
Working expenses and taxes (113.47 per cent.).....1,196,005 32

Deficiency (\$1,245.08 per mile).....\$141,939 28

The lines worked are the main line from South Vallejo, Cal., west to Sacramento, 60 miles; the branch from Napa Junction to Calistoga, 35 miles, and from Davis to Knight's Landing, 19 miles, 114 miles in all. The company also runs steamboat lines from San Francisco to Vallejo in connection with its trains, and from San Francisco to Stockton and Sacramento. The Knight's Landing Branch formerly extended to Marysville, but part of it was destroyed by freshets four years ago, and it has never been rebuilt.

Nashville, Chattanooga & St. Louis.

This company owns and works a line from Chattanooga, Tenn., northwest to Nashville and thence west by north to the Mississippi River at Hickman, Ky., in all 321 miles, with branches from Bridgeport, Ala., to Jasper, Tenn., 12 miles, and from Wartrace, Tenn., to Shelbyville, 9 miles, making 342 miles in all. The road west of Nashville was formerly the Nashville & Northwestern Railroad and was bought from the State of Tennessee by the company (then the Nashville & Chattanooga) and completed to Hickman. The "St. Louis" was added to the company's name subsequently to this purchase.

The property is represented as follows:

Stock (\$19,226 per mile).....\$6,575,295
Funded debt (\$19,883 per mile).....6,800,000

Total (\$39,109 per mile).....\$13,375,295

The annual interest charge is \$446,000, or \$1,304 per mile.

For the year ending June 30 the earnings and expenses of the road were as follows:

Earnings:	1874-75.	1873-74.	Inc. or Dec.	P. C.
From freight.....	\$1,128,171.21	\$1,283,546.96	Dec..	\$155,375.75 12.1
Passengers.....	488,782.43	527,477.85	Dec..	38,695.42 7.3
Mails.....	38,608.92	38,805.64	Dec..	196.72 0.5
Rents.....	25,263.63	26,802.52	Dec..	1,538.89 6.7

Total earnings.....\$1,680,826.19 \$1,876,632.97 Dec.. \$195,806.78 10.4

Expenses:

Maintenance of way.....	\$346,243.69	\$449,161.80	Dec..	\$102,918.11 22.9
Motive power.....	317,418.33	485,377.93	Dec..	167,959.60 52.9
Maintenance of cars.....	121,095.45	485,377.93	Dec..	364,282.48 30.0
Conducting trans- portation.....	286,718.72	323,559.87	Dec..	36,841.15 11.4
Miscellaneous ex- penses.....	80,478.26	85,657.72	Dec..	5,179.46 6.0

Total expenses.....\$1,151,954.45 \$1,343,757.32 Dec.. \$191,802.87 16.3

Net earnings.....\$528,871.74 \$532,875.65 Dec.. \$4,003.91 0.8

Gross earnings per
mile.....4,914.70 5,487.23 Dec.. 572.53 10.4

Net earnings per
mile.....1,546.41 1,558.12 Dec.. 11.71 0.8

Per cent. of exp'es
.....68.53 71.60 Dec.. 3.07 4.3

There was a serious loss of business caused by the injury done to the road by the extraordinary floods of last year, which also increased the expenses by \$23,551.60 in repairs. Light crops in Tennessee also diminished the receipts, but the greatest cause of the falling off was the continuance of low rates caused by too active competition. Material reductions were made last year in salaries and other expenses, and the road has been worked with the strictest economy, as is shown by the reduction in expenses. There was an actual increase in the tonnage carried of 5,954 tons.

The months of July and August, the first two of the current year, show an increase of \$36,649.43 in net earnings.

The report says:

"Three additional spans (308 lineal feet) of the Tennessee River bridge at Bridgeport have been replaced with iron spans, Fink triangular truss, on most favorable terms, at a cost of \$30,138.33, which will be paid for during this fiscal year. The amount is included in the bills payable account. There is also included in that account an item of \$30,000 of annuity obligations which run for twenty years (\$1,500 of which is paid annually and charged to operating expenses), obligations growing out of the Harpeth accident in July, 1871."

"The company has enough locomotive engines and cars to do a largely increased business, and the track on both divisions of your line is in good order."

"Having given the steel rail a fair test with the iron rail in the yards at Nashville, the use of the steel rail on the Chattanooga Division has been determined on, and, while its first cost will add considerably to the cost of renewing the track, the renewal will be gradual, and when once accomplished will save largely in the road repair account."

"The promise of mineral developments along the line of the Chattanooga Division, and the erection of iron works is encouraging, and considerable will be done in that direction as soon as the country entirely recovers from the effects of the panic of 1873, and a more healthy commercial feeling is restored."

"The suit brought in December, 1869, by the McMinnville & Manchester Railroad Company against the Nashville & Chattanooga Railroad Company for iron taken from their road by the Federal authority during the war, and placed on the Nashville & Chattanooga Railroad, has been compromised and settled. By the terms of the settlement the McMinnville & Manchester Railroad Company transferred and assigned to your company all of its right, title, interest and claim against the United States for said iron, etc., amounting to \$—-. Whatever quantity of that iron may have been put down on your road by the Federal Government, an equal quantity of your iron was taken up and sold by the Government. Besides, the settlement between your company and the Federal Government, made on the first of June, 1872, covered all iron then in your track, and, therefore, any iron so placed in your track by officers of the United States was, in that way, paid for by your company."

After referring at length to the evils resulting from the great competition for through business, and to the advantages possessed by the road as to Western and Northwestern connections, the President says: "The St. Louis Division of your line is comparatively a new road, and as yet has contributed but little to the net earnings of our company, but when the same improvement and thrift along its way are developed, as are seen on the Chattanooga Division (which improvement must come gradually), the average gross and net earnings of the line will be increased, as neither division can have, for many years to come, more competition than they had last year."

"Located as your line is for through business, and with its good local business on the Chattanooga Division, and with a reasonable prospect of an increase of local and through business on the St. Louis Division, if conservative influence in the maintenance of reasonable and remunerative rates prevail, working in harmony with our important connections, it has, to my mind, a very hopeful future, and may be made to pay reasonable and regular dividends to its stockholders."

Constitution of the German Railroad Union.

We give below a translation of this document as amended at the late Bremen convention:

§ 1. *Object.*—Under the name of "German Railroad Union" a number of managers of German railroads have entered into an association whose object is to advance their own interests and those of the public by discussions in common and united action.

§ 2. *Participation and Admission.*—All railroad managements within the limits of the German Empire, and the Austrian-Hungarian monarchy, as also the Grand Duchy of Luxemburg, are entitled to participation in the Union, but only with regard to those sections of railroads which are situated within the limits before described.

The railroad which makes application for admission into the Union must not only have a junction with another railroad already received into the Union, but also must be a locomotive railroad and be in operation; it has also to show that the object in establishing the road was to supply a general public necessity of passenger and freight traffic, and therefore that its establishment does not serve local interests alone.

The railroad management which desires to be received into the Union must also itself have control of the management of the working of the road. If it transfers the conduct of transportation on its road wholly or partly to another management belonging to the Union, then it can, for the time and for the section whose working management does not belong to it, participate in the Union only in this delegated manner, and it belongs to the delegate to determine whether the road or section of road under its working management shall belong to the Union in all its relations.

The admission of the newly entering railroads is effected, subject, however, to the approval of the general convention, through the Executive Directory, after due notice given to it. The Executive Directory is to give information of the provisional admission to the other managements, subject to the final decision in the next general convention.

The Executive Directory is, however, only authorized to provide for the admission of a management, subject to the subsequent approval of the general convention, when the road to be received has a length of at least 30 kilometres (18.6 miles). If it has not a length of fully 30 kilometres, then it remains for the general convention, to which previous notice of the action for this purpose must be submitted, to decide on its admission and right to vote.

Moreover, it remains the privilege of the general convention in exceptional cases to admit into the Union such managements as have not their headquarters within the limits of the countries named, but having connection with a railroad of the Union for reciprocal through traffic. However, such admission requires a unanimous vote.

Every newly admitted management is subject to the decisions theretofore accepted by all the managements and imparted to it for that purpose.

§ 3. *Executive Directory.*—For the conduct of the business an Executive Directory is chosen every three years at the general convention.

Every management is required to accept the election falling on it, and only that management which has last conducted the business can decline an election falling upon it a second time.

All the expenses and costs arising from the conduct of the business are covered from the treasury of the Union, and especially the cost of the office, and of its employees, established for the dispatch of the affairs of the Union. The making of contracts for service is done by the Executive Directory on consultation with the Committee on Constitution.

The Executive Directory has the care of the entire management of the affairs of the Union, and has especially to dispatch the current matters belonging to management, to prepare and execute the decisions of the Union, to call, to prepare for and to conduct general conventions.

§ 4. *Regular General Convention.*—Every year, as a rule at the end of July, on a day to be designated by the Executive Directory at least 14 days previously, the general convention is to be held at the place designated by the Union. Every management sends to it one or more deputies, and exercises its right to vote through a suitable authorization.

§ 5. *Subjects for Action of the Union.*—Whatever matters may be considered suitable by one of the united managements may form subjects for action of the Union. The notification is given to the Executive Directory, which must refer the matter to the proper committee.

The choice of the committees, which should be standing for all important branches of business, is made for three years by the general convention on nomination of the Executive Directory. For the preliminary consideration of such matters as may not fall within the limits of one or the other of the standing committees, the Executive Directory names special committees from the managements in the Union.

In the nomination for the election or in the appointment of committees, the Executive Directory must have proper regard for the interests of the railroads of the different districts over which the Union extends.

Every committee names its presiding management, whose duty it is to impart the subjects to be considered to the members of the committee for the report, to call meetings of the committee, and to conduct its proceedings.

The presiding management must notify the Executive Directory of the distribution of the subjects to be reported on, the appointment of sessions of the committee and of its conclusions; the announcing of the committee's conclusions to the managements of the Union is effected through the Executive Directory.

A record of the proceedings of the committees will be kept and sent to members of the committee and to the Executive Directory.

Those matters with whose treatment the committee was intrusted by the Executive Directory will be the subjects of its conclusions.

The committee conclusions will go into effect only when within eight weeks from their announcement to the Union managements they are not rejected by a tenth of the votes represented in the Union.

In other matters, the committee have chiefly to prepare subjects under consideration for the action of the general convention.

The committee reports are to be made in writing and submitted to the Executive Directory, which has to take charge of printing them and distributing them among the members of the Union a sufficient time before the general convention.

Besides, in the general convention an oral exposition of the report is to be made by a reporter, to be appointed by the committee. In some important and pressing cases the written report may be omitted.

§ 6. *Order of Business.*—As introduction to the proceedings, the Chairman always gives a review of the current condition of the Union. Thereupon follows the consideration of those matters which remained unfinished at previous general conventions. Next, the convention will proceed to consideration of new motions made in the manner prescribed (§ 5), and thereupon exceptionally matters proposed later or in the general convention for the first time may be considered, in case this is demanded by at least three of the managements represented.

The general convention reserves the right to refer matters which affect only the interests of a few managements to their separate consideration.

The close of the proceedings is formed by the selection of the place for the next general convention and the choice of a new Executive Directory, whereupon the minutes are to be read and approved by the Executive Directory and at least six other delegates.

§ 7. *Order of the Day.*—In accordance with the above, an order of the day is to be drawn up by the Executive Directory, which will be announced to the several managements in the invitations to the general convention.

§ 8. *Extraordinary General Convention.*—Extraordinary general conventions likewise can only be called by the Executive Directory, which must fix the time and place therefor, and is required to appoint them on the demand of three managements; in these cases the ground of the call for the convention must be designated in the notes of invitation.

§ 9. *Resolutions.*—The result of the deliberation is determined by a majority of votes, and, in case it is demanded by one dissenting vote, by means of a special balloting, in which every management represented exercises a voting power in proportion to the length of the roads and parts of roads worked by it, on the basis that a total length within the Union (§ 2),

up to 75 kilometres has 1 vote,
over 75 to 225 " " 2 votes,
" 225 " 450 " " 3 "
" 450 " 750 " " 4 "
" 750 " 1,125 " " 5 "

and then one vote more for every 375 kilometres; in which balloting, however, one and the same person may not give votes for several railroad managements which belong directly to the Union.

In case of a tie vote, the Chairman gives the decision. On the part of those managements which have not accepted the regulations concerning through freight and passenger traffic, or concerning the distribution of Union tickets, a right of voting will not be exercised on subjects relating to these matters.

§ 10. *Acceptance of the Resolutions.*—The resolutions of the general convention—with exception of those on the reception of new members—first become binding when they have been approved by nine-tenths of all the votes represented in the Union.

After adjournment, within fourteen days after the conclusion of the proceedings, the Executive Directory will send the minutes of the proceedings to all the Union managements. The declaration of acceptance or rejection must be given within a period of eight weeks, beginning with the eighth day after the sending of the minutes. If the declaration is not received by the Executive Directory within this period, then the silent management will be considered as consenting.

The Executive Directory will announce the result of the declarations to all the managements. If the majority of nine-tenths is not obtained, then the Executive Directory refers the matter back to the committee which prepared it for further consideration.

Resolutions concerning changes in the constitution of the Union and concerning rates require the approval of all the managements.

§ 11. *Execution of the Resolutions.*—The Executive Directory watches over the carrying out of the Union's resolutions. The Union managements, within four weeks after the announcement of the ratification of a resolution, will give the Executive Directory notice of its execution, by forwarding the orders issued on that account.

If a management neglects to carry out any resolution, and the Executive Directory does not succeed in inducing it to put it in force, then the latter must bring the matter before the next general convention. It remains for the latter to take further action in the circumstances.

§ 12. *Arbitration Proceedings.*—All conflicting questions arising out of the Union regulations concerning passenger, baggage, freight, and car traffic between members of the Union are to be decided by an arbitration, and without litigation.

Every management in the Union is bound to accept an appointment as arbitrator.

Should the contending managements not come to an agreement as to the management to be chosen as arbitrator within four weeks after the difference occurred, then on motion of either of these managements the Executive Directory of the Union must choose a management to undertake the office of arbitrator.

§ 13. *Expenses.*—For the settlement of all expenditures for the affairs of the Union, in which are included the expenses of the representation of the Executive Directory at the general conventions for four delegates to be sent by it, a fund is employed, which is provided from contributions of the separate managements, as often as the necessity demands, arranged in such a way that every management pays:

1. Without regard to the mileage of its roads, a fixed contribution of 200 marks (\$48.60 gold).
2. In addition, a contribution of one mark (24.3 cents) per kilometre (0.6214 mile), for every kilometre of road (fractions exceeding even kilometres taken as whole kilometres) which it works, whether its own or the property of another.

This fund will be controlled by the Executive Directory, which will render an account of it to the regular general convention.

§ 14. *Withdrawal.*—Every management is free to withdraw from the Union, but only at the four periods, Jan. 1, April 1, July 1 and Oct. 1, after six months' previous notice has been given to the Executive Directory, which shall immediately give notice thereof to the other managements.